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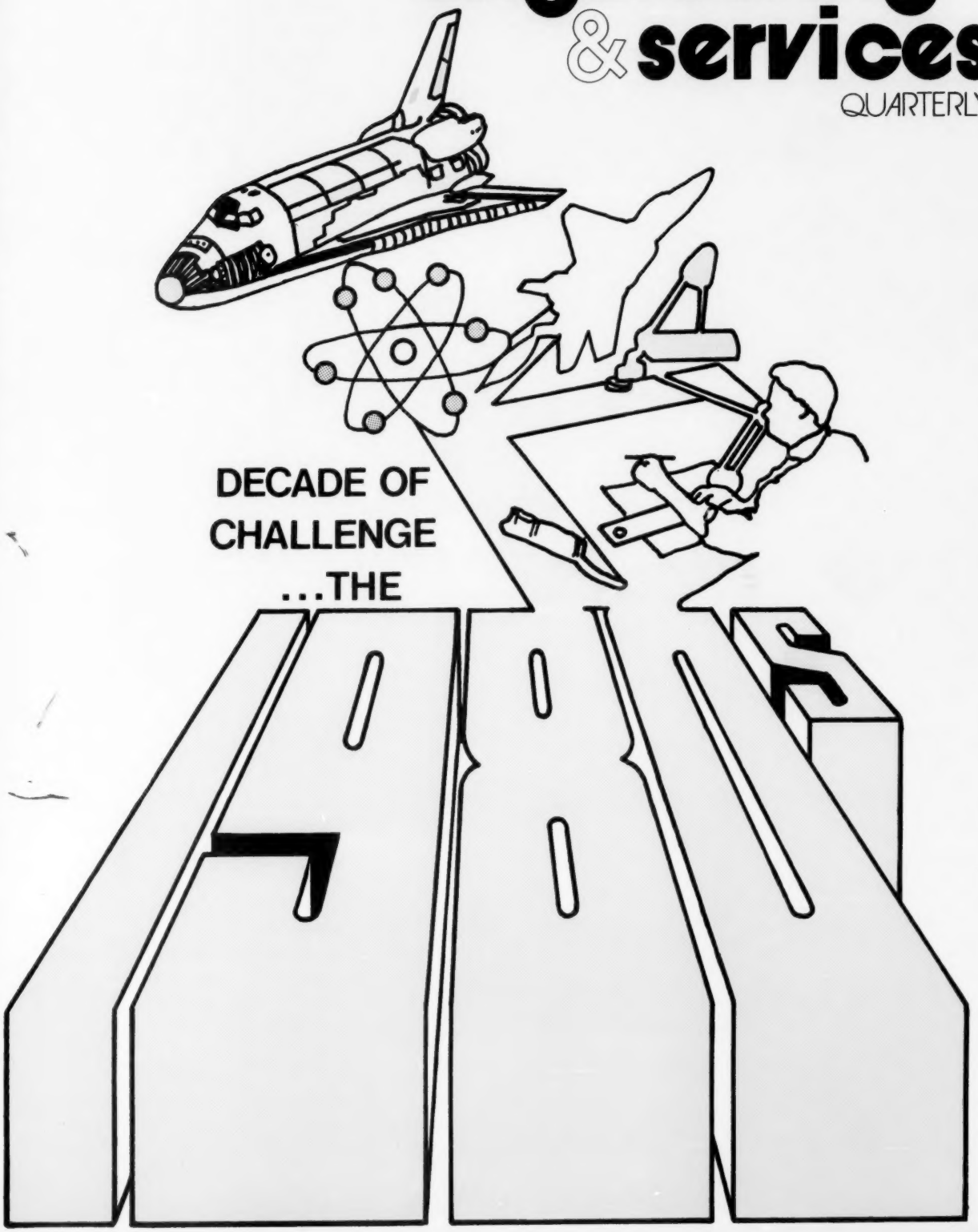
AIR FORCE engineering & services QUARTERLY



Promotion selection statistics continue to prove outstanding for Engineering and Services. Within the past weeks, the following announcements have been made: **Maj Gen William D. Gilbert,** Director of Engineering and Services, HQ USAF, has been named a permanent major general; The CY 1979 Temporary Colonel's Board selectees include **Frank E. Bendrick; Darrell G. Bittle; Roger G. Bush; Kenneth W. Canfield; Donald L. Denton; William R. Gaddie; Frederick S. Gersh; Harvey J. Haas; Donald A. Heinz; Ralph B. Holtmann; Harry R. Honaker; Richard B. Lewis; Douglas H. Merkle; Hubert S. Nethercot; William V. Randall; George M. Riddle; and James H. Rogers.** Below the Zone selectees are **James L. Baushke; Harry W. Glaze; and Ray D. Schwartz. Col Sheldon J. Lustig,** DCS/Engineering & Services, HQ SAC, was nominated for promotion to brigadier general.

The CY 1980 Permanent Lieutenant Colonel Regular Air Force List, released on 1 February, contained the names of 50 Engineering and Services officers. Six of these 50 will have a grade change and we offer them especial congratulations. This is particularly significant because it once again demonstrates there are advancement opportunities beyond the temporary officer promotion program.

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AFRP 85-1 VOL 21 NO 1 FEB 1980

AIR FORCE engineering & services QUARTERLY

Maj Gen William D. Gilbert
Director
Engineering and Services
HQ USAF
Col Hisao Yamada
Commander
Engineering & Services Center
Tyndall AFB, Florida

Engineers and Services personnel will face demanding challenges in the 1980s. See articles on pages 3 and 7.

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Taking on the 1980s

As we close out the 1970s and embark into the 1980s, I'd like to review where we've been and what the future might hold. My 1979 "From the Director" messages centered on "People: Responsibility and Resource"; "Image: Perceptions and Results"; "Image"; and "The First Priority Mission." Basic to my approach has been the emphasis on our wartime mission, taking care of our Engineering and Services personnel resources and the projection of the right image coupled with the results we achieve.

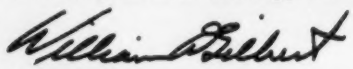
I believe 1979 was a good year. Our 1979 promotion statistics to major, lieutenant colonel and colonel have been outstanding. However, we cannot be complacent as our deserving people must continue to get the recognition they have so richly earned.

We've made great progress in Prime BEEF/RIBS training, Joint Contingency Construction Requirements Study (Wartime Engineering Requirements), Energy Conservation and Quality of Life Improvements. We've still got a long way to go but it is indeed gratifying to know that the top leadership in the Air Force does recognize our role and our contributions in support of the Air Force's mission.

We are beginning to reap the benefits. The December 1979 Engineering and Services Conference was an outstanding event. It allowed for the leaders of our business to exchange information on mutual concerns and initiatives. The conference was a timely gathering for me to close out the 1970s and set the stage for the 1980s. Therefore, I encourage everyone to review the *Engineering and Services Long Range Planning Guide: Directorate Goals and Objectives.* It provides a roadmap for our business to follow in the future and covers the following areas:

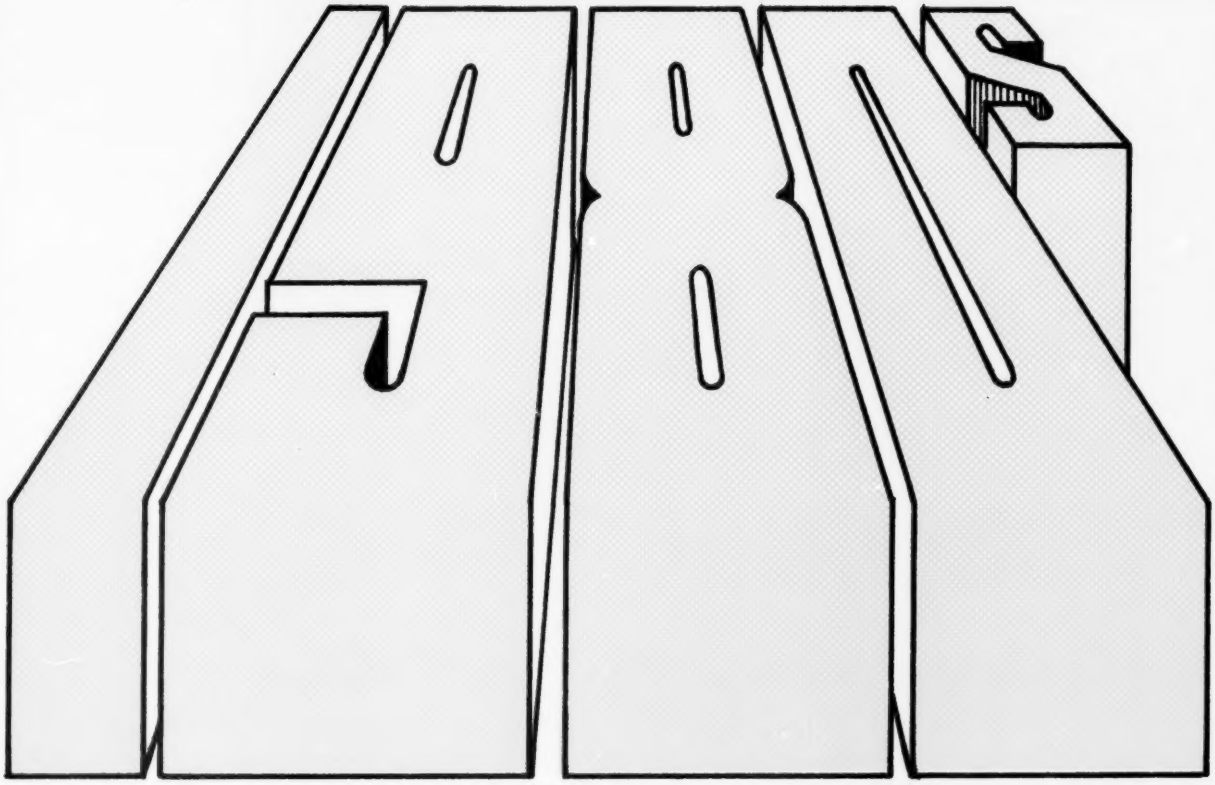
Readiness; Energy; Fire Protection; Super Projects; Joint Nation Financing; Environmental Quality of Life; Productivity; Utility Systems; Pavements; Housing; Design and Construction Equipment; Research and Development; and Base Level Management.

The challenge for the 1980s is here and now. I look forward to taking them on with your continued support. Best wishes for the future.



WILLIAM D. GILBERT
Major General, USAF
Director of Engineering and Services

Decade of Challenge ... the



by Maj Gen William D. Gilbert

New demands and significant issues will face the engineering and services community as we enter the 1980s. Our purpose and direction must be made clear. Challenges will be before us in the major areas of design, construction and follow-on facility operations and maintenance. The purpose of this article will be to explain some of the issues and major projects that will confront us in the Air Force and to also mention how we plan to direct our manpower talent to produce the best results in these areas.

The Organization — Who is Where

At about this time last year, we were undergoing significant organizational changes; this condition has continued for most of the year. Originally, we proposed to move a major portion of our Washington-based engineering staff to the new Air Force Engineering and Services Center (AFESC) at Tyndall AFB, Florida. As a matter of fact, sufficient functional transfers occurred to allow us to evaluate the split operation between Washington and Tyndall. We basically found this geographical arrangement awkward and unworkable. The pressures to remain responsive and supportive of DOD, Congress and the entire Washington engineering community were simply too great to conduct business by long distance. This was especially true in the areas of environmental policy and planning, design and construction, real property management, housing and contingency planning.

Based on this experience, the Air Force decided that the major functions mentioned above would be located in Washington and only the Services function along with the Operations and Maintenance Division would be located at the AFESC.

The Center at Tyndall, however, will continue as our focal point for research and development, technical field assistance and base level management. There have also been separate offices newly established to address energy, fire protection and readiness. The technical field assistance provided by the Center ranges from fire protection, energy, natural resources planning, and pavements to worldwide generator overhaul and electrical power production repair. In the area of readiness, the Center structures and trains our mobility forces to include the Prime BEEF, Prime RIBS and RED HORSE teams. It also operates the Readiness Center which is tied to the Air Force Crisis Action System. The research and development efforts are mainly in the civil engineering, facilities engineering and environmental quality areas with on-going efforts in rapid runway repair, hardened aircraft shelters, corrosion, fire fighting foams, air pollutants, wastewater treatment, alternate fuels and advanced energy technology.

Things New and Important

The following subjects are but a few of the main issues and concerns that will be facing us into the 1980s. The organization described previously is custom-fit to match our resources to these issues. Our short term focus and long range planning will be centered around these most pressing challenges.

Energy

With national attention focused on fuels shortages and energy conservation, this issue certainly requires no introduction. The Air Force expends about 29 percent of its energy on facilities with the present energy consumption trend going downward. However, most of the time and effort will be devoted in the next 10 years to changing our energy consumption pattern for facilities. Using 1975 figures as a baseline, our goal is to reduce consumption by 20 percent by 1985.

We have instituted an Energy Group at AFESC. Our major command engineers are also being used to constitute an Energy Steering Group. Major attention will be devoted to all aspects of conservation and optimization, coal conversion, geothermal and solar energy applications, and the development of a dual facility energy source capability. We will be targeting in on designing and constructing energy efficient new structures that can achieve a 45 percent reduction in energy consumption over what new structures consumed in the past. Our desire is to shift the dependence as much as possible from petroleum fuels to alternate and renewable forms of energy. Obviously a united effort will be required to attack the energy issue with innovation as the cornerstone of all our work.

Readiness

Readiness of course is our prime reason for existence, that is, being ready to support air operations worldwide in both peacetime and in periods of conflict. Our aim is to establish the runway, support facilities and utility systems as basic and essential parts of our weapon system acquisition and follow-on operational capability. We will also continue to work at producing clear separations of responsibilities between the Air Force, our sister Services and local national labor forces with regard to wartime engineering and construction requirements.

Considerable effort has been taken already with respect to providing a proper manpower force structure to meet known contingency requirements. Now our attention will also shift to establishing new initiatives in war reserve material.

Airfield survivability will also continue to receive primary attention since it is so vitally connected to the launch and recovery capability of our aircraft. We foresee the possibilities of enormous breakthroughs in the 1980s in the construction and repair of airfield pavements. We also forecast the development of new materials which will enable the rapid repair of aircraft runways.

Upgrade of Pavements and Utilities

We will be actively seeking to improve the overall condition of our airfield pavements and aging utility systems. Included in this issue is the development of a systematic way to assess, inspect, condition code, determine and prioritize requirements for these systems.

Many of our pavements and utility systems have long ago outlived their projected and designed life and have been subjected to piecemeal repair. While maintenance has enabled the systems and runways to continue operating, frequency of maintenance in many cases is so high due to age, that major replacement or repair would be both cost and energy effective.

The creation of a continuing assessment capability will enable us to accurately determine condition and requirements and subsequently permit us to apply limited resources to those highest priority requirements closely aligned to mission capability.

Productivity

It is quite apparent that the cost of resources, in particular labor and material, will continue to skyrocket in the 1980s. We will have to attack this issue by improving productivity, that is by improving the **efficiency** of our work through better mixes of such resources as labor, equipment, materials and time; and by improving the **effectiveness** of our final work products. Efficiency means the competent accomplishment of a job with a minimum expenditure of resources. Effectiveness means that the completed job satisfies its intended purpose.

We will have to **manage** productivity and not just think it will happen on its own. Managers at all levels will have to become more aware of the factors that impact upon productivity and possess some type of capability to assess their local condition. Each civil engineering squadron will have to concentrate on doing each work task efficiently and to organize the entire work ac-

complishment process so that the results are effective in supporting the local base mission.

Productivity, in this sense, does not necessarily mean working harder. Rather, it requires us to work smarter. Our productivity will depend on our capacity to find ways to do a better job with what we have. It will become a necessity in the future to do exactly that.

Environmental Policy

A continuing issue into the 1980s will be environmental policy, control and planning. The activities and functions associated with real property construction, maintenance and management naturally necessitate high involvement with environmental assessment and analysis.

Our efforts into the 1980s will concentrate on the development of an airbase comprehensive planning methodology, a standard environmental impact analysis process and pollution abatement management process. In all cases the resultant products must be characterized by simplicity, clear communication, cost and manpower effective, and conducive to local base level control. The products should ultimately aid in the improvement of environmental quality, expeditious accomplishment of environmental analysis, improvement of natural resources, and planning and use of real property.

Quality of Life

Great strides have been made in improving the facility quality of life for Air Force people as it affects their working, living and recreational environment. This issue will remain with us into the next decade.

An organized and systematic improvement plan has been initiated that encompasses facility design concepts, new construction methods and requirements, and renovation innovations that will accommodate, reinforce and be compatible with the changing life styles of Air Force personnel in particular and the American public in general. High priority attention will be devoted to improvements in family housing, bachelor housing, recreational facilities, dormitories, shopping centers and the general facility planning for an airbase.

Major Projects

The 1980s will place before the Air Force some of the largest and most complex construction projects ever developed by the military arm of our nation. They will include the providing of facilities for weapon systems that will have the most significant impact upon our national defense, strategic power and the economy of our nation.

MX Missile System

The MX missile will restore survivability to our land based ICBMs and will constitute one of the most significant national construction undertakings into the 1980s. The program proposed to deploy a new 190,000 pound ICBM in a mobile basing mode is both survivable and verifiable. The first flight of the 71-foot high, 92 inch diameter ballistic missile is expected in 1983 with initial deployment in 1986. The MX will carry 10 warheads, with a throw-weight of 7900 pounds, and range of 6000 nautical miles.

About 200 missiles will employ a basing mode requiring a network of above ground roadways connecting horizontal shelters. One missile will be concealed among a grouping of 23 shelters. The missiles will be moved by a transportor-erector-launcher (TEL) which is normally concealed in one of the horizontal shelters. There will be a total of 4,600 shelters. The primary candidate states for deployment of the 200 missiles are Nevada, Utah, Arizona and New Mexico.

Construction requirements include a missile assembly building, mechanical maintenance facility, rail transfer facility, stage storage facility, launch facilities and roads and grounds. The total cost (in FY 1980 dollars) for the deployed operational system over 10 years is $33 billion, with the latest facility construction estimates at $14.5 billion. The initial operational capability is expected in 1986 and the system should be fully ready (200 missiles) in 1989.

Work aspects that need to be planned, tracked and managed would include environmental analysis, interagency/intergovernmental coordination, environmental quality requirements, land acquisition, facility design, programming, construction and project management. The entire military engineering community will need to properly and responsibly accomplish this project which will enable our nation to improve the stability of the strategic balance, deny the Soviets any advantage should they pursue an arms race, and more safely pursue significant bilateral force reductions.

"Our very image as professionals will be at stake in the years ahead. How well we cope with the challenges of the 1980s will in effect determine this image. ... The perceptions must be clear."

Space Transportation System (STS)

The STS will consist of the Space Shuttle Vehicle, a variety of standard payload carriers, ground integration and launch facilities, and ground-based payload operations control centers. The STS will perform all services formerly accomplished by a variety of unmanned launch vehicles. It will also routinely perform tasks not possible or practical in the past, such as manned flight operations, in-space servicing and maintenance, payload retrieval and intact mission aborts. Probably the largest single unique characteristic about the STS is the ability to retrieve and reuse the space vehicle. Each shuttle orbiter should be able to fly at least 100 missions with seven crew members and specialists into orbits of up to 200 nautical miles.

Launches will be made from the Kennedy Space Center and Vandenberg AFB complexes. With a due-east launch from the Kennedy Space Center, the Shuttle can deliver payloads up to 65,000 pounds and return to earth with up to 32,000 pounds, a capability not provided by expendable launch vehicles. However, the maximum payload weight that the Shuttle can deliver into circular orbit is less when launched from Vandenberg AFB. The Air Force will provide all the facilities at Vandenberg necessary for recovery, turnaround and launch of the system. Maximum practical use will be made of existing facilities, including the airfield, maintenance and logistics buildings. Although the Kennedy Space Center initial operational capability is scheduled for late 1981, the Vandenberg complex, with an estimated cost of $328 million, has an initial operation date of December 1983.

The Space Shuttle, through its reusable cargo-carrying combination space-craft and aircraft capabilities, will greatly enhance the operation of our space program, adding a new dimension to our ability to use space for improving life on earth. Besides defense, STS will bring about unique capabilities in the areas of scientific research, agriculture, oceanography, communications, petroleum and mineral resources, timber management, and environmental control and analysis. The military engineering community will play a vital role in providing initial construction and follow-on facility management while being a key support element in America's space transportation system through the year 2000.

Israeli Air Bases

The construction of two air bases in Israel is a vitally important element in the successful execution of the April 1979 peace treaty between Israel and Egypt. The Air Force is responsible for overall program management of this construction, while the Army Corps of Engineers is to serve as the construction agent.

The two new air bases to be constructed in the Negev Desert at Ovda and Ramon, will replace two operational air bases that, under the terms of the treaty, the Government of Israel is relinquishing in the Sinai Desert. Although the sites for the new bases are now uninhabited and undeveloped, both bases must be designed, constructed and operational within three years. This program is unique to the Air Force not only because of the requirement to adhere to foreign government construction standards and criteria, but also because of the demanding time schedule and necessity to build two complete, modern air bases in remote conditions. The program is estimated to cost about $1 billion and require 3.8 million square yards of airfield pavements and roads; 1.9 million square feet of operational, maintenance, administrative and personnel support facilities; and 250 miles of base utility service systems.

The Years Ahead

The future will hold many new and different challenges. As military engineers, we will have to plan for the future years. We must be prepared to meet these challenges so as to greet them as opportunities and not problems. In order to do this our sights must be clear on the priority issues facing us. This will then serve as our guide for the expenditure of limited resources in terms of dollars, manpower and time.

The demands and needs for improvement in the areas of energy, readiness, existing facility upgrade, productivity, environmental planning, and quality of life will stretch our resources to the limits. We will have to be both effective and efficient in all the engineering tasks that range from the super construction projects to the maintenance and repair systems used to prolong the life of our facilities. We will also need to acquire and improve upon several skills that were previously infrequently utilized. The years ahead will demand technical skills in electronics, power generation systems using renewable non-petroleum based fuels, massive hydraulic systems, energy monitoring and control systems, and airfield pavements made from new polymer materials. These skills will not only be needed to accomplish and manage new construction, but also to properly complete follow-on facility maintenance and repair.

At the same time we will also have to be a blend of up-to-date managers in the fiscal, personnel and productivity arena. New requirements for construction will also continue overseas with special attention toward encouraging the increased involvement by our allied nations in strong military defense. Overseas construction initiatives will probably encourage joint nation financing, NATO infrastructure involvement in construction of wartime needed facilities during peacetime, and recoupment of US provided prefinanced construction funds. So, aside from being competent in both the engineering and management areas, we will also have an increased international flavor to our operations, necessitating the conducting of our work with a high degree of diplomacy.

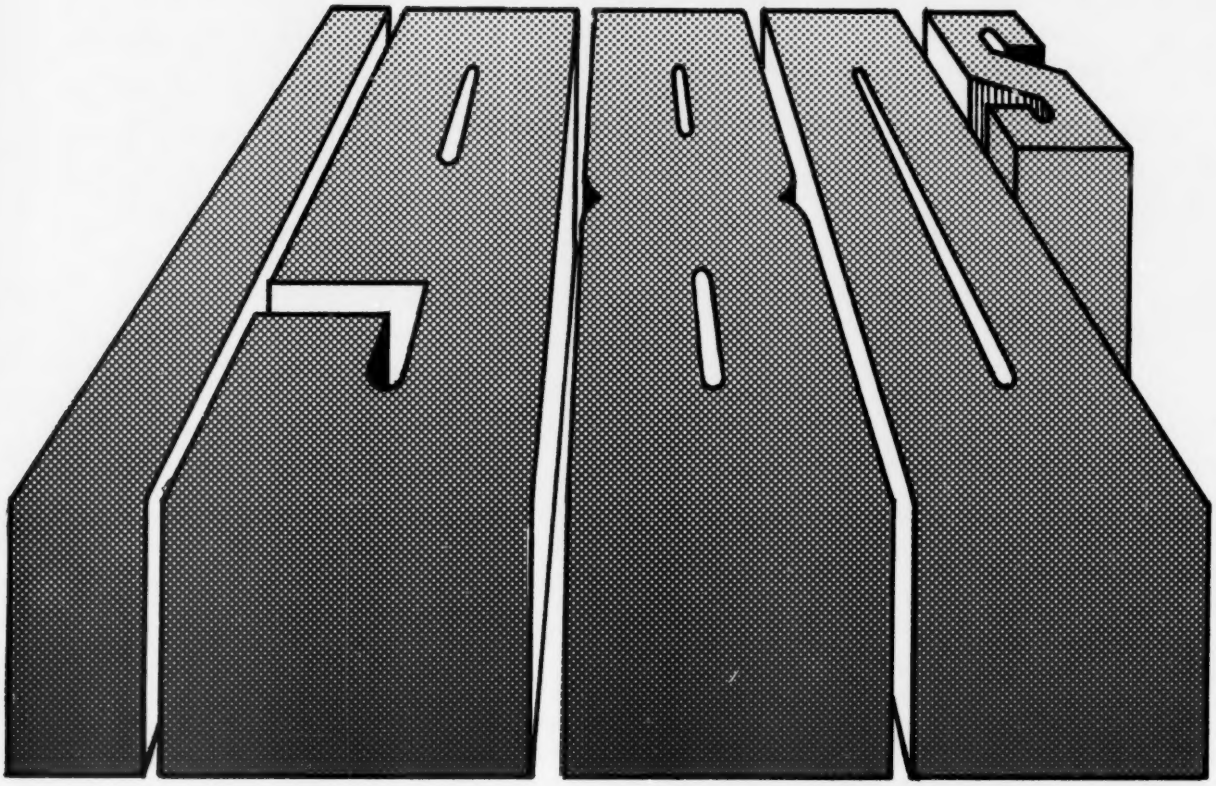
Yet our highest Air Force engineering priority area, the reason we do all these things, the major purpose for our existence as a military organization worldwide — is to be ready and capable to fight a war. If we are not ready to provide the launch and recovery platform plus necessary facilities, utilities and services to our air mission — then we have failed. The solution is to not only work harder, but smarter.

Our very image as professionals will be at stake in the years ahead. How well we cope with the challenges of the 1980s will in effect determine this image. It will be determined by the results we achieve and the perceptions of those we work for, serve and work with. The perceptions must be clear. We must meet the challenges of Air Force weapon system modernization, readiness initiatives especially in the area of airlift, and the new facilities to support continued space flight. Our image must be clear:

Professional;
Effective;
Efficient and
Innovative.

E&S

Services into the



Services is on its way to performing the job better into the new decade. A glance back over the past few years provides an insight into the changes that have occurred, and as a result, where the career field is today. Presently, there are several on-going actions which will influence the future, the effectiveness of the organization and operations, and its people.

by Lt Col Roy G. Kennington

Over four years ago, although most Services personnel were not possessed with the "Chicken Little" syndrome, you'd have had to be less than honest to deny that at times it did look as if the sky were falling. In general things looked pretty gloomy. Without dwelling on the past, it's important that we recognize how we got into the "briar patch" in the first place in order to gauge our success in getting out. This is not a chronological history of the Services career field; rather, it's a synopsis of events of the last few years designed

to give a capsule insight into changes that have occurred, where we are today as a result, and present some ongoing actions which will influence our future.

Numerous organizational changes have occurred within Services over the past several years, with the well-intentioned goal of doing the job more efficiently and effectively. The most important were:

- **Transfer of more centralized responsibility for exchange operations to the Army-Air Force Exchange Service (AAFES) via the Integrated Management concept;**
- **Transfer of the Property Disposal function (some will remember this as R&M) to the Defense Logistics Agency;**
- **Transfer of Clothing Sales Store operations to AAFES; and**
- **Centralized management of commissaries with the formation of the Air Force Commisary Service (AFCOMS).**

While these actions achieved the desired goals of reduction in costs and improved operations, it's obvious they also had an almost disastrous effect on the Services career field. The impact on functional responsibilities directly correlated in manpower terms with reductions in authorizations and grades. In simple terms, we took some "hits." The losses in authorizations and grades made shambles of any type of career pyramid, created overages and shortages within certain grades and year groups, with resultant cross-training and loss of some of our most knowledgeable and experienced people.

Improvements in menu selections and serving line facilities have been noted in recent years.

Between 1975-77, several events occurred which set the baseline for the future:

- **Worldwide merger of Engineering and Services at major command and Air Force levels:**
- **Move of Services training courses from Fort Lee, Virginia, to Lowry AFB, Colorado.**
- **Development of the training review conference;**
- **Initiation of functional Management Inspections of food service and billeting; and**
- **Establishment of the Services Enhancement Conference.**

Each of these events had different objectives and came about for a variety of reasons; however, all had a common goal — to recognize deficiencies in organization, training and operating procedures, and make changes designed to improve.

While all objectives have not been achieved — in fact, many have been modified — we have nevertheless made progress. The new lexicon of terms which has sprung up demonstrates how dynamic the business has become. Prime RIBS (Readiness in Base Services), a la carte, furnishings management, dormitory management, Air Force Services Contract Advisory Group, unaccompanied personnel housing, Services vice Supply Services, and consumer advocacy — all alien to our ears in the early 1970s — are now routine terminology. The changes in organization, classification, manpower, personnel and training to match these terms has been no less dynamic. A look at each including some readiness and educational initiatives, provides an insight to where we are and where we're headed.

Organization

The most dramatic and positive changes have been the merger of Services with Civil Engineering and the creation of the Air Force Engineering and Services Center (AFESC) at Tyndall AFB. The first has been a key to many of our successes and has given high level attention, concern and visibility at all levels to the need and importance of a strong Services function and supporting career field. With the move of Air Force Services Office (AFSO) from Philadelphia to Tyndall AFB completed, we now have, for the first time, all top level management of Services functions under one roof. This central direction of the function coupled with the proximity of the Engineering and Services Readiness Center and counterparts in DEM (with functional responsibility for all Engineering and Services manpower, personnel and training actions) permits a total perspective of the impact of any proposed actions. The latter has already paid big dividends and promises an even greater payoff in the future as we refine manpower standards, career progression, etc.

Presently two organizational changes are under review:

- **Assignment of dormitory management (centralized concept) to Services; and**
- **Establishment of the Services Support Branch (combines linen exchange and other supply related functions).**

The assignment of the centralized dormitory management function looks positive and, depending on the development of the manpower standard and approval process, should become effective in 1981. The Services Support Branch, although initially appearing to have a lot of advantages, also has some negative features due to unique command missions and will be permitted on an optional basis.

Manpower

For the first time we now have manpower standards for all Services' functional areas. The new standards are equitable and will provide the authorizations and grades to do the job. Some positive gains (which translate to more authorizations) have occurred in Services management and billeting with recognition of our role as the major command and base level consumer advocate and office of primary responsibility for training of honors teams. We, at the Center as well as the AFESMET, are not totally satisfied the standards fully recognize and measure such labor intensive activities as a la carte, take-out service, and progressive cooking in food service. As a result, there will probably be another look at food service again in the near future. For the immediate future, AFESMET has agreed to establish a nonmandatory standard for nonappropriated fund housekeepers in billeting over the next six months. This standard, when completed, will give billeting managers another tool to use in running their operations in a more efficient and businesslike manner.

Personnel

As would be expected, one of the most dynamic changes has been in the area of personnel management. In the enlisted area, promotions have kept pace with other career fields; however, we continue to have serious imbalances in some grades which cause us to lose talented people who don't seem to return at higher levels when we need them. The addition of billeting personnel to the 611X0 AFSC has helped broaden our personnel base; also, our early review of a proposal to convert dorm managers to the Services AFSC indicates it will be just the move needed to further expand the career field and fill in some gaps in the career progression pyramid. Additionally, as a result of a year long study, a decision has been reached to create a separate AFSC for commissary personnel. While there will be some misgivings on this issue, it is apparent the action will benefit both areas and therefore will be consummated in April 1980. In food service, the major change has been the combining of the cook and baker AFSC into one. With the completion of the AFSO move to the Center, we will begin looking at career pyramids in food service and recommending required actions to achieve desired career progression ladders which meet functional and individual needs.

COLONEL KENNINGTON *is Chief of the Food Management Division, Directorate of Housing and Services, Headquarters Air Force Engineering and Services Center, Tyndall AFB, Florida. He earned his bachelor's degree from the University of Mississippi and his master's degree from Ball State University. He has served in several Services positions since 1962.*

For the officer corps, the entire force is undergoing a major upheaval. The rated supplement which we have depended upon so heavily in the past is dwindling rapidly and will, for all practical purposes, be gone in the next few years. While we will continue to get some cross flow of field grade and senior captains from other career fields, it appears now the bulk of our replacements will be second lieutenant accessions (114 on board as this was written). While this lack of experience will hurt, it will also be a blessing to many young aggressive officers who will have the opportunity to achieve more responsible positions early in their careers. After much dedicated effort we have finally achieved the desired 75 percent base to 25 percent staff to base ratio, thus allowing many of our people to gain staff experience early in their careers. Additionally, we've had some gains in squadron commander positions with Tactical Air Command continuing at 18, Pacific Air Forces with two, and Strategic Air Command adding 22 during FYs 1978 and 79. We have recently suffered some setbacks with the rollback of some colonel positions but are working with major commands and other agencies to recoup these losses and eventually obtain eight to 10 positions, which should be adequate to achieve the desired progression ladder. These efforts are beginning to bear fruit, as evidenced by field grade promotions of Services officers over the last two or three years.

With the wide range of expertise required in current civilian positions, it's difficult to address a single progression ladder at this point in time. This, coupled with the fact that most jobs are lower to middle level (GS-3 to 7), seriously hampers our efforts to achieve upward mobility and explains why we've had such a large turnover in civilian managerial personnel. We have recently started work on the problem in billeting and provided the Office of Personnel Management with standard position descriptions for positions from billeting clerk to major command billeting manager. Hopefully, our proposed position descriptions will become the DOD standard and at least improve upon current inequities in grading of positions.

Training

More positive changes have occurred in the area of training than any other. Schools have moved from Fort Lee to Lowry AFB; all courses have been revised and updated; new courses (Billeting Manager, Staff Officer)

have been added; quotas increased; and to keep up with it all the Lowry AFB staff has been expanded. These changes, coupled with a change in the Air Training Command (ATC) organizational structure and continuing organizational changes in Services, have put us behind the curve revising CDCs to reflect current duties and responsibilities. With the changes programmed for the future, it appears this will be a continuing problem which we will have to work with ATC. We have recently received approval to include a la carte food service training and are working toward establishing a 3-level course for 611s as soon as possible. Continuous dialogue and visits between major commands, AFESC and Lowry AFB personnel are helping close the information gap and ensure Services personnel are receiving training which will help them do the job better at base level.

Education

While changes in this area have been few, they have nevertheless been significant. First, the two AFIT master's degree slots in Graduate Logistics Management have been moved from AFIT at Wright-Patterson AFB to Michigan State and Florida International with selectees now receiving master's degrees in hotel and restaurant management. In fact, we have three officers in the program this year. We will retain our food service Education with Industry position with the American Restaurant Association in Philadelphia for the foreseeable future and have recently received approval for a similar but biennial position in the hotel management area with a major hotel/motel chain.

Readiness

Any discussion of the state of affairs in any career field in this day and age would be woefully remiss if it did not address readiness efforts. Services is no exception, and up until this past year, it has been woefully behind the curve. We're playing catch-up but nonetheless have made tremendous progress, particularly in food service, by addressing requirements, capabilities and needs. We are a long way from where we need to be, but have established a solid baseline for future actions. The one-week field food service course that began in January 1980 at Eglin AFB in conjunction with Prime BEEF training is just the beginning of efforts to define requirements, train and equip our personnel to ensure that we are capable of performing our designated mission during war or contingencies. As the structuring of UTCs for Services and posturing of Prime RIBS teams is completed, training will be expended to include other primary functions. Our success in this area will have a major impact on the future of the Services career field.

The foregoing should by no means be construed to be all encompassing. There are several other actions, occurring each day at base, major commands, and at the AFESC which will improve effectiveness of the organization and operations and shape the course of the career field and people in it for the future. Progress sometimes seems agonizingly slow — however, as most food service people know, the sauce is the key to good creamed beef and you'll end up with a mess if you use improper ingredients or cook it too long. We're not out of the briar patch yet but we've come a long way in a few years and we are on our way to performing the job better into the 1980s.

E&S

Readiness in Base Services (Prime RIBS) is an example of the tremendous progress achieved in the past year. Just as Prime BEEF has come to denote readiness for civil engineers, the new Prime RIBS emblem will become the symbol of readiness for Services personnel.

Directorate of Engineering and Services

Current Emphasis

brief commentary on significant developments

POLYCHLORINATED BIPHENYLS (PCBs)--Information on storage, handling and disposal of PCBs was distributed by ALMAJCOM/DE letters, 9 Nov 79, and Polychlorinated Biphenyl information, 5 Dec 79, and message, 033325Z Dec 79. Additional information and guidance will be forwarded as it becomes available. Points of contact are Maj R. Rudolph, HQ USAF/LEEV, 227-1147, and Mr. R. Kibler, HQ AFESC/DEV, 970-6193.

SOLAR RETROFIT PROGRAM--A Military Construction Program has been established for solar energy. The purpose is to identify enough solar projects to help reach our 1985 goal of one percent of our energy consumption through solar and geothermal means. Resources for this program are in the FYDP. They will be addressed during the development of the POM. Both passive and active systems are encouraged with DHW and space heating applications stressed. (AFESC/DEB/970-6459).

USE OF THE 10-YEAR FACILITY ENERGY PLAN--A 10-year facility energy plan was distributed to the field in July 1979. It was written to establish Air Force policy for facility energy management and to act as a road map for reaching facility energy goals. The plan should be a part of every energy officer's reference library. (AFESC/DEB/970-6462)

1979 ENVIRONMENTAL AWARDS--Nominees for base environmental quality and natural resources conservation awards and for conservationist of the year will be selected in April 1980. A committee of national authorities will select Air Force winners who will also be nominated for the Secretary of Defense Award competition. Procedures are in AFR 900-45, Chapter 7. (AF/LEEV/227-2039).

INDUSTRIAL ENGINEERING BROCHURE--A new pamphlet entitled "Industrial Engineering Management" has been forwarded to all major commands for their optional use. It describes the role of the IE in Air Force Civil Engineering, the management of resources and provides some good tips. It can be obtained through your major command DEM office and will also be used by the AFIT School of Civil Engineering. (AF/LEEX/227-0189)

PAVEMENTS I.E. PROJECTS--Investigative engineering projects now underway will help Air Force solve some of its problems in the pavements area. One project will develop a recycling manual which will contain guidance on selecting the optimum recycling process for a particular pavement and provide design guidance and guide specifications for each recycling process. Another project will develop a non-jet fuel resistant, cold pour joint sealant for use in small quantities by in-house work forces in areas not subjected to fuel spillage. (AFESC/DEMP/970-6334).

(continued on next page)

UNDERGROUND HEAT DISTRIBUTION SYSTEM--The new Federal agency criteria require a certified manufacturer to supply and be responsible for a complete working underground heat distribution system. Agencies must define engineering requiremtns and tell designers how these requirements must be carried out to be compatible with the supplier's system. The overall benefit to the Air Force will be more reliable, energy efficient and cost-effective underground heat distribution systems. (AFESC/DEMM/970-6352).

BUILT-UP ROOF MANAGEMENT PROGRAM--The final manuscript for AFM 91-36, Built-Up Roof Management Program, has been submitted to HQ USAF/DAP for publication. This new manual which applies to the maintenance repair and replacement of built-up roofs should be available for use in April 1980. (AFESC/DEMM/970-6363).

UNIFORM CLOTHING POLICIES--AFM 67-1, Vol I, Part Three, Chapter 2, Air Force Uniform Clothing Policies and Procedures, has been revised and published with a date of 8 Oct 1979. The uniform clothing policy guidance contains many changes and should be reviewed for compliance. (AF/LEEX/227-7763).

AFR 440-24, WAR RESERVE POLICY, 28 NOV 1979--Provides updated and expanded policy and guidance for Engineering and Services participation in the WHM program. The new regulation addresses clothing and subsistence, and provides new authority for a complete range of prestocked materials for all civil engineering wartime missions. (AF/LEEX/225-6500).

YOUTH CONSERVATION CORPS--Twenty-two resident YCC camps are projected to operate from June to August. Camp locations have been selected based on installation budget requests. Late proposals are welcomed and will be considered if funds become available. (AF/LEEX/227-2039).

CROSS CONNECTION/BACKFLOW PREVENTION--Improper cross connection control has caused potable water contamination at several installations. The installation of the proper backflow devices on potable water supplies, to prevent contamination by toxic chemicals is of the utmost importance. These devices should be checked once every six months and required maintenance should be performed. Some backflow prevention devices require field testing to insure their proper operation. This testing should be accomplished at least every 12 months. (AFESC/DEMM).

DOD TRAFFIC ENGINEERING SEMINARS--US Army Military Traffic Management Command will hold six seminars for traffic engineers on the fundamentals of traffic engineering and Highway Safety Program Standards (HSPS) 12 and 13. The importance of using proper traffic engineering principles and techniques in the design and construction of our installation roadways and intersections is stressed as the key to reducing personal injury and property damage arising from traffic accidents. The How Tos of implementing HSPS programs at the installation level, as required by AFR 75-88, are presented in these sessions. (AFESC/DEMP).

THE NAME OF THE GAME IS Customer Service

by 2Lt Ralph W. Williams, III

In these times of limited budgets and manpower resources, Base Civil Engineering at Travis AFB has employed successful techniques in making itself more responsive to the needs of its customers. Needless to say, at Travis AFB ....

In Base Civil Engineering at Travis AFB, California, the name of the game is customer service. Over the past 14 months the 60th Civil Engineering Squadron has made considerable progress in making itself more responsive to the needs of its customers, ranging from more rapid completion of job orders to reductions in customer wait time for minor construction (MC) work orders.

The Squadron's first major success was in the area of direct scheduled work (DSW). In July 1978 there were 484 delinquent direct scheduled job orders, and about 200 old IWP (in-service work plan) job orders. The next month we began using the new procedures outlined in **AFR 85-1** to eliminate this large backlog. By 15 October, we reduced the number of delinquent direct scheduled job orders to less than 50 and had eliminated all of the old IWP job orders by converting a few to work orders and accomplishing the remainder as DSW.

At Travis AFB, DSW takes priority over all other work. Other types of work, such as RMP and work orders, are managed to allow DSW to seek a nearly unconstrained level of effort. We have established an internal goal of never permitting the number of delinquent direct scheduled job orders to exceed 50. This goal has been consistently achieved since 15 October 1978 by devot-

A power technician connects an electrical line to school zone warning lights.

A carpenter crewman assists in the renovation of a facility that will be occupied by the base band.

While deployed to Little Rock AFB, Travis' Prime BEEF team installed a water line to a picnic area.

Paint is mixed prior to application during preparations of a vacant housing unit for new occupants.

ing approximately 45 percent of our available labor on direct scheduled work. In turn, this has forced our shop supervisors to do the oldest work first without regard for job complexity. The results have been that our customers are getting their work done much more quickly, thereby creating a greater degree of customer satisfaction.

In July, August and September 1978 a review of our approved, but not scheduled MC work orders, revealed that we had nearly one and one-half year's backlog of MC work (based on our ability to do this type of work). Recognizing that the insertion of higher priority work could easily add further delays of as much as six months to work that had already been in the backlog for a long time, we used the Programs Working Group within the Facilities Board to "weed out" low priority and "nice-to-have" work. By this action we reduced the manhours of MC work to 15,000 which is about a seven-month backlog. The seven-month figure was arrived at by determining that it takes approximately seven months of programming, planning and material lead time from the time the average request is received to the time we can begin work. Since the beginning of FY 1979 we have maintained our backlog of MC work at seven months by approving work at the same rate at which it is accomplished. This has enabled us to give our customers a realistic time frame in which they can expect their work done. Once again, this has resulted in improved customer satisfaction.

Military family housing is another area in which we have made significant progress. Family housing records go back to the beginning of FY 1973. At no time during the six-year period between the beginning of FY 1973 and the end of FY 1978 were we able to achieve the Air Force goal of 99 percent occupancy in our 2,167 family housing units. In an attempt to turn this negative trend around, we received funds to employ 15 overhires in Family Housing Maintenance during the heavy turnover summer months. We also established better coordination between Family Housing Maintenance, Family Housing Management and the Traffic Management office. Because of the excellent housing market in our area, we found that the majority of the officers at Travis AFB did not wish to live on base. This created a problem in filling vacant officer housing. We overcame this dilemma through redistribution and redesignation of 147 of our 488 officer units. The 15 overhires, better coordination, and decreased number of officer units proved to be the right formula to bring our occupancy rate for all of FY 1979 to 99.2 percent. We were also able to bring our average turnaround time down to six **calendar** days, which includes weekends and holidays. This figure is well below the Air Force goal of five **working** days. Our improved occupancy rate and low turn-around time have resulted in more BAQ dollars for the Air Force as well as increased customer satisfaction through increased housing availability.

The base has always had a reputation for an excellent Prime BEEF program. In December 1978 we had an opportunity to show just how capable we are. The Squadron was the first unit in the Air Force to deploy a 70-man, CF-2 team under the new ORI test grading criteria. On the morning of 3 December 1978, Travis' CF-2A team was deployed to Little Rock AFB, Arkansas. During the four days the team was at Little Rock, they worked a total of 2,598 manhours on 11 work orders provided by Little Rock Base Civil Engineering. The team was graded in three areas: personnel, logistics and training. In all three areas the team received a grade of outstanding as well as an overall grade of outstanding. As a result of the superior performance of Travis' CF-2 team, the grading criteria were proven feasible and have been officially adopted by the Air Force.

We are obviously proud of the hard work and positive results achieved during the past many months within Base Civil Engineering at Travis AFB. This is not to say, however, that we have solved all of our problems. There are still other mountains to climb. What we can say is that with the outstanding motivation and "can do" attitude displayed by both managers and "worker bees" alike, continued successes are virtually guaranteed.

E&S

LIEUTENANT WILLIAMS *is Chief of the Planning Section, Base Civil Engineering, HQ60 Air Base Group, Travis AFB, California. He received his bachelor of science degree in civil engineering from Virginia Military Institute.*

Letting the base community know how they can reduce energy consumption is a daily process. At Misawa AB, engineers turned to a rigorous communications program which played a big role in reducing base total energy consumption in FY 1979 by almost 10 percent below 1975 use.

Successful Energy Conservation Demands Community Involvement

by 1st Lt John A. Burzynski, EIT

The role of the Base Civil Engineer (BCE) as utility monitor and "energy czar" has become critical. Inflation has decreased our operations and maintenance (O&M) dollars by 10 percent per year, and the continuing demand on the existing supplies of fossil fuels is generating increased prices, further depleting our buying power.

At Misawa AB, Japan, our fuel oil price, per gallon, is estimated to increase by more than 35 percent in FY 1980 over FY 1979. At that rate, the price will double, sometime during FY 1981, a period of less than two calendar years. Assuming this rate of increase is sustained, by FY 1985 the price will have risen about 1000 percent over FY 1975. At the same time, our energy consumption goal will be to reduce our usage to 80 percent of FY 1975 levels. A reduction in consumption by at least 20 percent is imperative. To counter the effects of this ten-fold price increase, base level energy conservation programs will continue to take on increased importance as the front line of attack to this problem. The President has termed the current situation as "the moral equivalent of war." What happens at base level will ultimately determine the outcome of this war.

The energy conservation business is nothing new to civil engineering people. On a formal basis, we have been in the business for about the last five years. Practically speaking, however, we have been at it a lot longer. As engineers, we have always strived to increase the efficiency of our machinery. As managers, resource conservation has always been one of our primary responsibilities. Now we are being called upon to spearhead the energy conservation attack.

Our past experience and training are invaluable assets in undertaking this task, but the nature of the problem itself has called for new approaches and requires the engineer to use some new tools he's not familiar with. Some of these tools have been tried and proven in other professions, but are somewhat alien to the engineering community. A brief look at the problem and the tools for repair will illustrate this point.

The energy crisis has brought to light one fact which is the crux of the matter: we are living on a fixed amount of fossil fuels, petroleum in particular. Before that supply is exhausted, a two-pronged approach is being applied to solve the problem. As a long term solution, technology is attempting to provide a suitable alternative fuel. In the meantime, however, conservation of existing supplies is essential to provide sufficient time for research to test the alternatives and implement a permanent solution. Regardless of the source of our future energy supplies, solar, nuclear, etc., conservation at the present time is absolutely essential.

Conservation of utilities/fuels at base level also entails a bilateral approach. We engineer a partial solution to the problem by enhancing the energy efficiency of our buildings. Facilities on Air Force bases worldwide are being retrofitted with insulation in walls and on ceilings, new storm windows and solar shielding. All of these projects are conventional approaches which we can apply with little involvement on the part of the community.

But it is community involvement which is necessary if our conservation programs are to be successful. The consumer must be approached by the engineer and

encouraged to become involved in solving the problem.

Involving the consumer in our conservation efforts requires that we develop a recurring conservation program cycle of education, evaluation and feedback. The tools to accomplish these tasks are the various forms of communications media available to us. Most stateside bases have two forms at their disposal: oral, including Commander's calls and staff meetings, and printed, encompassing base newspapers and base bulletins. At overseas locations, the American Forces Radio and Television Service (AFRTS) provides added media sources. Use of any or all of these tools requires that the engineer assume the role of public relations person for energy conservation:

- **Educating the public;**
- **Evaluating the energy consumption performance of the base;**
- **Reporting the findings of the evaluation (feedback; and**
- **Re-educating the public on its weak points.**

The cycle is continuous and, if the tools are used properly, goals are met and funds that were previously earmarked for utilities can be used for "people projects."

Each of the three steps of the conservation program cycle (education, evaluation, feedback) is singularly important, yet interdependent on the other steps. In coordination, they compliment each other to provide continual achievement of goals. Let's briefly examine each before looking at the cumulative effects.

Education lays the foundation for the succeeding steps. In every program, it is imperative that, initially, the main thrust of education be to convince the populace that a problem does exist.

As recently as March 1979, United Press International reported that "Many Americans consider the energy crisis a sham ..." and that it is "... akin to the Easter Bunny — there's been a lot of talk about it but no one has seen it yet." If the public does not perceive that a problem exists, all further efforts will fail miserably. Everyone, in government as a whole, has had trouble in this area. In the military, the problem may be compounded by rotation of personnel. Sometimes the influence of other service branches may act to reinforce our program or to negatively influence it. At Misawa AB, we faced an energy identity crisis during FY 1978 and at the beginning of FY 1979. Although we had an active energy conservation program, results in the positive direction were minimal. It appeared that many personnel on this tri-service installation were not convinced that a problem existed, and therefore, response was only cursory. At the beginning of FY 1979, we embarked on a publicity program, primarily by way of articles in the base newspaper, explaining that a problem really did exist. After this, our audience understood the situation and were receptive to a continuing program of education through dissemination of conservation tips.

Letting your base populace know how they can reduce consumption is a daily process. People need to be reminded of the basics of conservation, i.e., turning out lights in empty rooms, unplugging coffee pots, etc. The base bulletin is an excellent vehicle for conveying this message. Send Base Administration a list of tips and request that one be published in each bulletin.

Tips should be publicized in the Commander's "Factline," "Hotline," "Probeline," etc. Also, don't miss the chance to appropriately add a conservation tip to your response to a "Hotline" query from the Wing Commander. Once you have the consumers educated, then evaluate their performance. Headquarters US Air Force, DOD and the President have given us the goals; let the public know where and how the goals came about, as part of the education process, and then determine if the goals have been met. If not, find out why the message isn't getting across. Then report your findings.

Feedback is probably the most important step in the entire process. Your base populace needs to know how they're doing. Of course, the timing of the feedback enhances its effectiveness. The sooner after the fact the report is rendered, the more effective the report will be. At a minimum, a monthly or weekly summary, of consumption rated against the goal, should be published in the base newspaper.

At Misawa AB, we're fortunate to have an AFRTS TV station. We broadcast an energy report as part of the evening news each day. The report consists of advising the base populace of the electrical consumption for the previous day and the amount this consumption deviated above or below the FY 1975 baseline. Further, a conservation tip is included in the report. In the past, we have from time to time equated energy overuse to a dollar factor. We've also translated the dollars into a potential "people's project" which could have been funded for those dollars. The prime effectiveness of the report is realized from its immediacy. Since we are generally appealing to a non-technical audience, to whom the terms "KWH" and "BTU" have little meaning, equating the energy "wasted" or "saved" into more tangible, non-scientific terminology is also beneficial. The addition of the conservation tip to the report is the start of the next cycle, and re-evaluation.

Effective use of the available media can make the BCE's job as "energy czar" much easier. At Misawa AB, we feel that effective media use is the primary reason why our total energy consumption in FY 1979 was about 10 percent below FY 1975. Through the process of education, evaluation and feedback, we hope to reduce energy consumption to acceptable levels before it's too late, and we are all left out in the cold. E&S

LIEUTENANT BURZYNSKI *is a Mechanical Engineer in the Engineering, Construction and Environmental Programming Branch, 6112 Civil Engineering Squadron, Misawa AB, Japan. He received his bachelor's degree in mechanical engineering from the University of Massachusetts. He is an Engineer-In-Training in Illinois and is an associate member of the American Society of Mechanical Engineers.*

1979 Air Force Design Awards

Eight Air Force installations were recognized for architectural excellence in total design in the 1979 Air Force Design Awards Program, sponsored by the Directorate of Engineering and Services. The awards were announced during the Air Force Engineering and Services Worldwide Conference at Homestead AFB, Florida in December.

First Honor Awards in Type I, Completed Buildings, include:

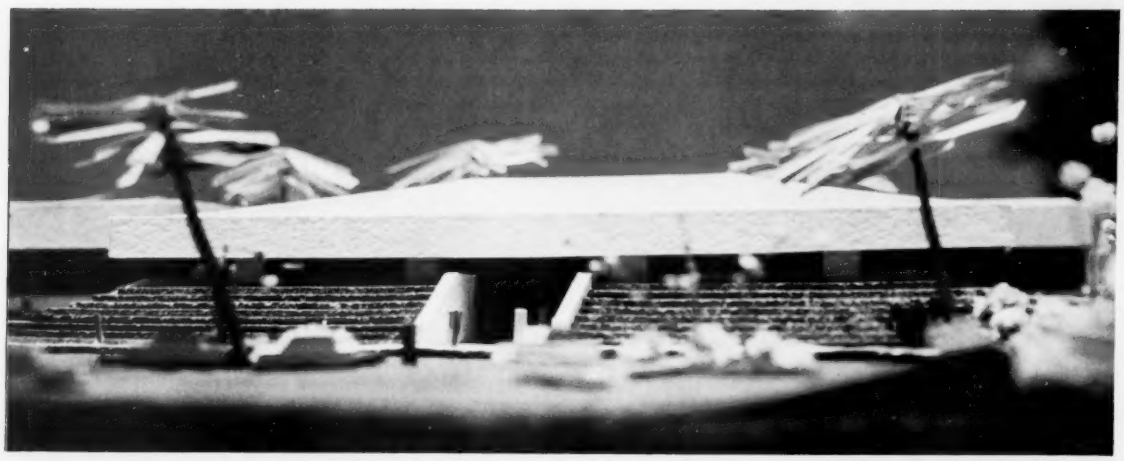
- **Avionics Laboratory, Wright-Patterson AFB, Ohio.** Architect: Yosh Nakazawa and Associates for Air Force Systems Command.
- **Commissary, Tinker AFB, Oklahoma.** Architect: Frankfurt-Short-Bruza for Air Force Logistics Command.
- **Heating Plant, O'Hare Air Reserve, Chicago, Illinois.** Architect: John Dolio and Associates for Air Force Reserve.

The Child Care Center, Charleston AFB, South Carolina, received Honorable Mention. Architect: Captain Stephen Derochi for Military Airlift Command.

Winners in Type II, Concepts, include:

- **Joint Surveillance Facility, Griffiss AFB, New York.** Architect: Stetson-Dale for Strategic Air Command.
- **Wing Headquarters Building, Tinker AFB, Oklahoma.** Architect: Frankfurt-Short-Bruza for Tactical Air Command.
- **Community Center Mall, Vandenberg AFB, California.** Architect: Andrew Joncich and Associates for Strategic Air Command.
- **Commissary, Clark AFB, Philippines.** Architect: Cromwell, Neyland, Truemper, Levy & Gatchell, Inc., and R.G. Villarosa for Pacific Air Forces.

A record total of 76 projects were submitted for the 1979 competition which was conducted by the Engineering and Construction Divison of the Directorate. It marked the fourth consecutive year that the program has been held and the first year that the program was divided into two categories: Type I, completed buildings, and Type II, concepts.



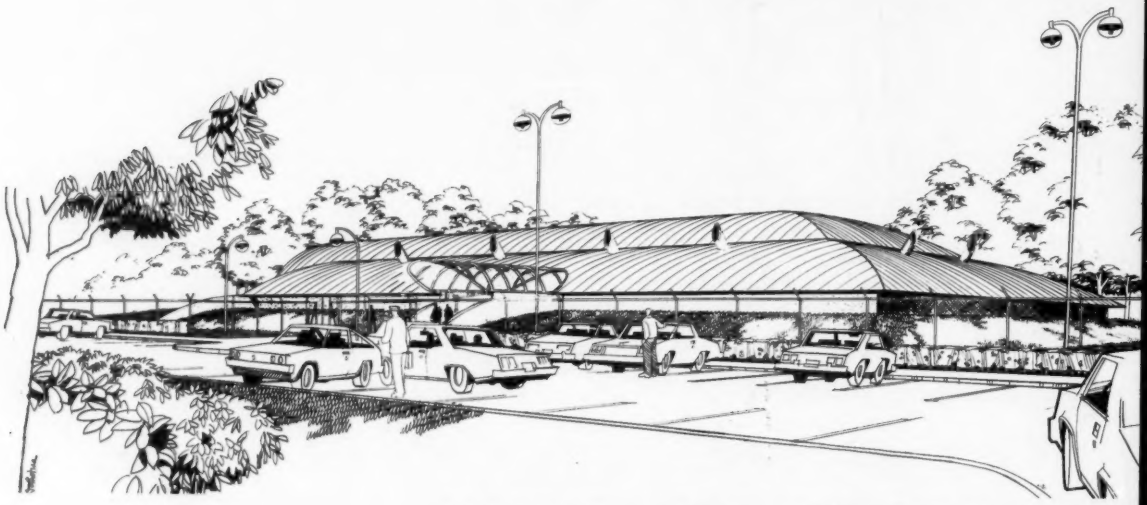
Commissary, Clark AFB, Philippines

The broadening of the program into two projects types resulted in the record number of submissions which included a larger variety of projects such as solar energy, landscaping and interior repair and renovation. Additionally, the Type II concepts projects provided an incentive to younger military and civilian personnel to participate in the competition since they now have a better chance of receiving recognition for work on a project while at that location.

Each of the types of projects were evaluated separately. Type I projects were evaluated on the basis of appropriateness of material and structural system, compatibility of design with function, relationship of the facility to surrounding buildings, quality of site and landscape plan, appropriations of plant material, use of color, signage and graphics, handicapped accessibility, quality of interior design, energy efficiency, lighting design and relationship of programmed costs to final costs.

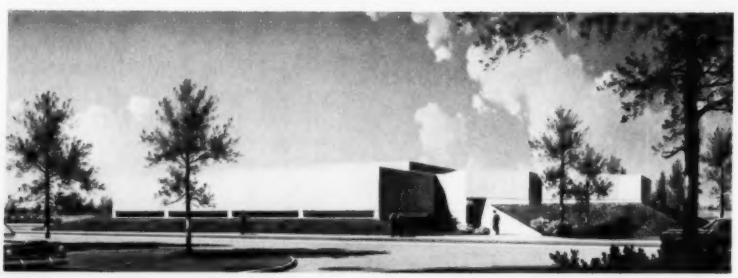
Type II projects were evaluated on the basis of program description, site conditions, the appropriations of the architectural solution as presented in a rendering or photographs, the floor plan and the building sections.

Avionics Laboratory,
Wright-Patterson AFB, Ohio

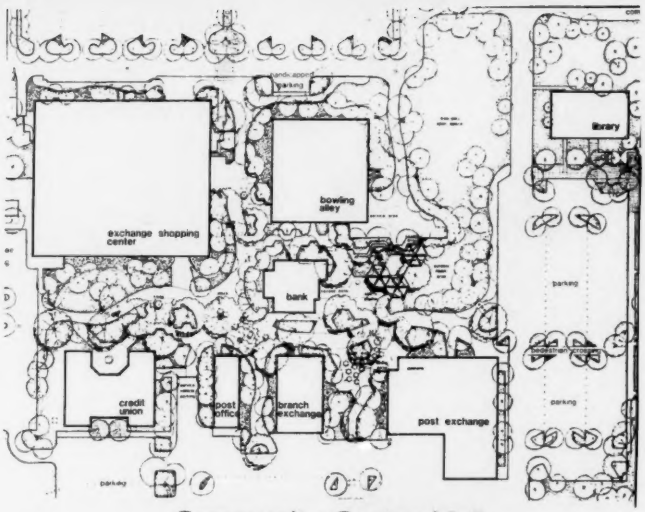


Joint Surveillance Facility, Griffiss AFB, New York

Wing Headquarters, Tinker AFB, Oklahoma



The award jury consisted of Robert C. Broshar, F.A.I.A., and James M. Harris, F.A.I.A., both vice presidents of the National Headquarters, American Institute of Architects; and Gaylord Witherspoon, Head, Department of Architectural Studies, Clemson University. Representing the Air Staff on the jury were John Earl, architect; Charles Watkins, landscape architect; Hammond Myers, mechanical engineer; and Lt Col James Nero, Air Staff Judge Advocate Officer who represented the using community of the Air Force. E&S



Community Center Mall, Vandenberg AFB, California

Child Care Center, Charleston AFB, South Carolina

Heating Plant, O'Hare Air Reserve, Chicago, Illinois

Commissary, Tinker AFB, Oklahoma

First Impressions

by Ronald J. Sonnier

As everyone knows, creating a good first impression when first meeting someone invariably results in how that person ends up feeling about you. The same can be said for Air Force bases. Most new arrivals at your base, on temporary duty or permanent change of station (PCS) status, will form their first impression of your base by the service they receive and the appearance of your Billeting Office, since that is usually their first stop after going through the gate. If your Billeting Office is in an attractive facility and, more importantly, if your Billeting clerks are helpful and cheerful toward visitors and newcomers, their first impression of your base will be a good one and no matter how many other obstacles they may encounter later, their first impression will usually remain with them. For transients and PCS personnel, the Billeting Office will also be their last stop prior to leaving your base and again their first impression should be reinforced by their last impression.

Eglin AFB has expanded on the first impression of Billeting Offices by changing the concept to that of a Reception Center. Housed in what was once the Child Care Facility, the major mission of the Reception Center is to take care of people. The renovation of the facility and the furnishings were purchased with appropriated funds. All the decorative items, plants, pictures, etc. were purchased with non-appropriated Billeting funds. The original idea was to provide a one-stop facility for newcomers and transients where all pertinent local information could be obtained and quarters assigned. In addition, the Intro Program, the locator function and Family Services (on a part-time basis) were added. All areas are under the supervision of the Billeting Officer except for Family Services.

The warm look of wood greets visitors to the Reception Center.

A neat, uncluttered counter awaits new arrivals on base.

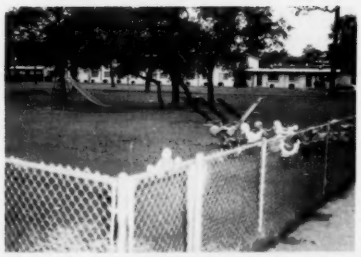
Visitors can relax on a porch and drink a refreshment.

The Reception Center was designed with people in mind. It has a fenced in playground area at the rear of the facility, vending machines inside, and a room to secure personal luggage. In addition, phones are available for local, off-base and AUTOVON calls; brochures are available on local tourist attractions as well as base maps, base bus

RONALD SONNIER
is Deputy Chief, Services Division, HQ 3201 Air Base Group, Eglin AFB, Florida. He received a bachelor's degree in agriculture from the University of Southwestern Louisiana and master's degrees in logistics management and public administration from the Air Force Institute of Technology and Troy State University, respectively.

... and at Eglin AFB, they want them to be lasting impressions. Here's how the base changed the concept of the billeting office to that of a Reception Center with one goal: taking care of newcomers and transients with a one-stop facility.

... as satisfied customers pick up keys to their quarters.



A playground keeps children occupied while parents sign in.

transportation schedules, listings of car rental agencies, motels/hotels, pet kennels, etc. In short, everything a stranger to your base would probably want to know is offered.

The Reception Center concept goes beyond a nice facility to greet newcomers and transient guests. Employees working in this facility are trained to insure that they provide a real and personalized service to each customer they encounter. They are encouraged to empathize with their customer and are in turn motivated by feeling that they are really helping someone in need of their assistance. Hopefully, the Reception Center leaves both the customer and the employee with a warm feeling. E&S

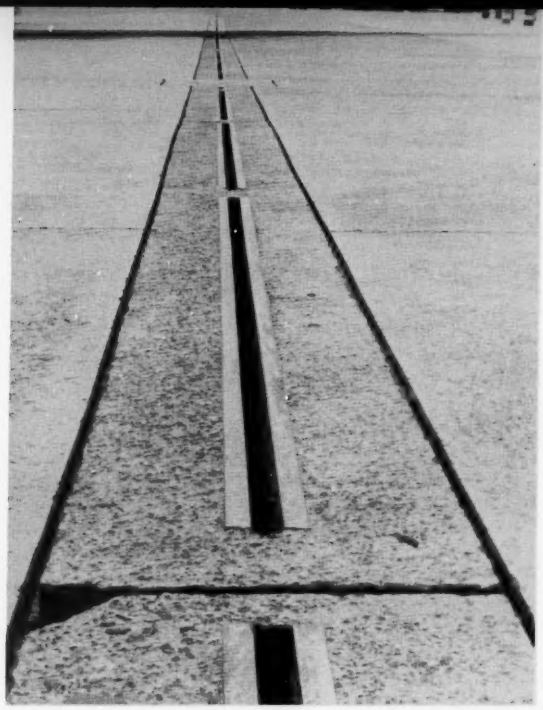
Toiletries, tobacco and other sundries are stocked.

Approximately 35 percent of the epoxy coating to the apron and taxiway at Ramstein AB, West Germany was complete when this aerial photograph was taken.

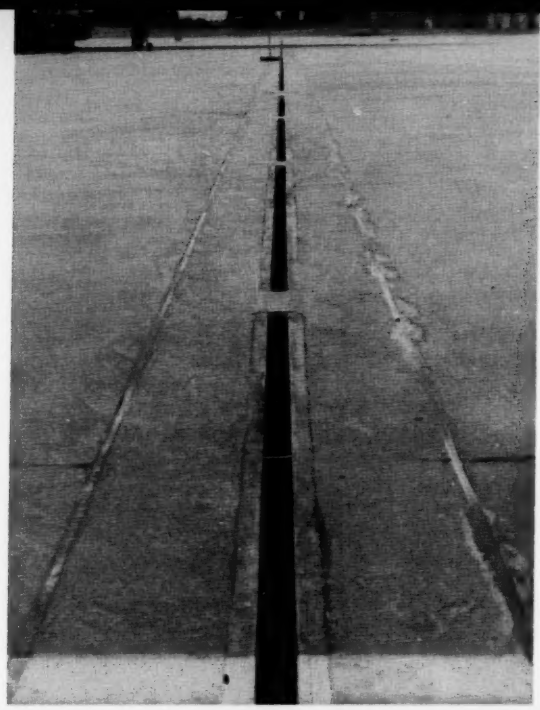
To Save a Million Dollars

When the 129,000 square meters of concrete that made up the apron and taxiway at Ramstein AB were poured, the project was hailed as one of the best in West Germany. Within a few years, the concrete began deteriorating and caused continuous headaches for operating personnel. Engineers turned to an epoxy coating as a solution and it worked. Here's the story about their efforts

by H.R. Marien



BEFORE: Scaling and surface erosion of the slot drainage on the apron are visible before coating.



AFTER: Effects of scaling and erosion are nonexistent after epoxy coating was applied.

Ramstein AB serves as one of four main aerial ports in Europe and is the primary aerial resupply port for troops stationed in the Kaiserslautern-Zweibrucken area of southwestern Germany. The apron and taxiway at Ramstein AB were built during 1970 and 1971, and contain over 129,000 square meters of concrete pavement. When completed in 1971, this project was heralded as one of the largest and best pavement jobs in West Germany. One can imagine the anxiety of the Base Civil Engineer when spalling began in January 1973. At first, surface spalling and scaling of the concrete was localized but by the following winter (1973-74) it was obvious that the entire pavement was affected. Eventually the spalling and scaling spread over the entire 129,000 square meter area to depths of 1 centimeter, creating a constant hazard of foreign object damage (FOD) for jet aircraft. In 1974 a vacuum sweeper was assigned full time to the area to pick up the small and broken pieces of concrete.

A number of durability, petrographic and air entrainment tests were conducted on the concrete. Experts from the United States and West Germany were consulted and, of course, a suit was filed against the contractor who constructed the apron. The results of these tests and analysis showed that the cement content in the upper 1 centimeter of the concrete was low and there was insufficient entrained air to prevent freeze-thaw damage. The contractor argued that the concrete damage was caused by the use of urea and other deicing agents. However, studies in the 1960s by the Waterways Experiment Station (WES), Corps of Engineers, and by other experts have shown that urea is not harmful to sound concrete pavement.

Regardless of the causes and eventual outcome of court decisions on who was at fault, the fact remained that 129,000 square meters of pavement in a prime operating location in Europe was deteriorating and causing continuous headaches for operating personnel. C-141, C-130 and C-5 aircraft were using the apron and taxiway daily and the amount of traffic was increasing each month. Construction costs were increasing rapidly because of dollar devaluation with respect to the German mark and because local market conditions were creating inflation in construction costs. Clearly a solution was needed quickly.

Initially two solutions to this problem were proposed. The first was a 20 centimeter unreinforced concrete overlay over the entire area and the second was a 15 centimeter steel reinforced concrete overlay. However, with both these solutions, changes in the drainage pattern of the apron and elevation of a slot drainage system and POL refueling system in the apron would be required. A third alternative was sought. Since the early 1970s the Germans had tested and used epoxy coatings on their highway autobahn system. Epoxy coatings had also been used successfully to coat steel fuel tanks, which otherwise would have needed replacement. Two epoxy products were selected for evaluation and further investigation.

The investigation of the use of epoxies was divided

Application of prime epoxy coating penetrates and seals the concrete on the apron.

Final epoxy coating is squeegeed over the apron surface to a thickness of three millimeters.

into three separate areas:

- First, a detailed investigation of the concrete itself was performed to see if the epoxy would bond satisfactorily. It also included testing concrete cores that had been coated with the epoxy. This work was done at WES.
- Second, a review of the performance of epoxy coating projects in Germany was conducted.
- Third, an evaluation was made of the construction techniques required to ensure that an epoxy coating could be successfully applied under the environmental conditions at Ramstein AB.

The investigation of the concrete was conducted by coating three concrete bays at Ramstein AB in April and August 1976 with one of the epoxy products. After these samples had endured the winter of 1976, cores were taken and sent to the WES for further tests. Testing of the samples at WES did not produce the failures expected between the epoxy and concrete. Delamination under freeze-thaw conditions did not occur and further tests on the concrete itself showed that it was structurally sound below the surface.

There was some frost resistance in the lower sections of the samples evaluated. It should be noted that although the tests at WES did not produce failure, the concrete experts there did not recommend using the coating. The eventual problem with coating concretes with a vapor tight membrane, WES contended, is that moisture, through capillary attraction, builds up under the surface until the concrete is saturated. Once saturated, the concrete is much more susceptible to freeze-thaw damage.

Inspections were conducted at a tank training center near Ulm, West Germany, and of the Ingolstadt AB near Munich showed virtually no deterioration of the epoxy surfaces after four winters of freeze-thaw action. Epoxy coatings on the taxiways, runways and roads at these locations were successful in preventing further freeze-thaw damage of the concrete pavement. Two different epoxy compounds had been installed, one marketed by the firm Posehl and the other marketed by Concrete Chemie. There was no perceived difference in the durability of the two epoxy compounds after five years of use.

Application of epoxy coatings were observed at the Ingolstadt AB and also at the air terminal in Frankfurt. Discussions with contractors applying the epoxies showed that although construction techniques had to be closely controlled, it was possible to successfully apply the epoxy coating in Ramstein climatical conditions with trained German laborers.

Based on these successful investigations, invitations for bids were sent out in May 1977 for a repair to the apron. Two methods were bid upon, a 20 centimeter unreinforced concrete overlay and an epoxy coating overlay. The steel reinforced concrete overlay was not considered because of high cost. The specifications were written to ensure that a high degree of quality control would be exercised under both of these two options. German DIN standards were used for the specifications. When the bids were received, the epoxy option cost 40 percent less than the other options considered.

Encouraged by the results that the Germans had obtained with epoxy coatings, the positive test results from WES, and the possibility of saving 40 percent in resurfacing costs, the contract was awarded to epoxy coat the apron. The product selected was a polyamide amine epoxy "Concretin IH" produced by Concrete Chemie, Russelsheim, West Germany. Although WES had recommended that epoxy coating not be used, there were several advantages which led to the selection of the epoxy coating option for the apron. They included: good existing underslab drainage which would limit moisture from migrating up through the concrete; the structural soundness of the concrete below the surface 1 centimeter; the possibility of getting new concrete under German DIN 1045 which also had poor frost resistance; and considerable cost savings of epoxy coating. The contract called for coating 10,000 square meters in September of 1977 with a shut down of work until April of 1978. In April an evaluation of the epoxy to withstand the environmental conditions at the apron was conducted before the work was allowed to proceed. Then the remaining 119,000 square meters

were coated during the construction season April to September 1978.

The sequence of applying the epoxy coating was as follows: The surface was cleaned by sandblasting. The epoxy coating was applied in three layers. First, a prime coat of 300-400 grams/m² was applied to penetrate and seal the concrete. Then a filler layer or leveling course consisting of one part quartz sand to one part epoxy was applied at the rate of 400-500 grams/m². The final layer consisted of 10 parts quartz sand to one part epoxy and was applied at a rate of 400-500 grams/m². It was squeegeed over the surface to bring the minimum thickness of the coating to 3 mm. This final layer was pigmented a dark gray-green to tone down the normal light color of the coating. Quartz sand was broadcast over the surface to provide a nonskid surface for the aircraft to operate upon.

Quality control procedures were strictly enforced during the entire project. The tests used to determine the effectiveness of the epoxy to concrete bond and also to evaluate the soundness of the concrete to which the epoxy was bonded was called a "tear off test." In this test a 4 centimeter diameter circle was scribed through the surface of the epoxy down to the concrete to isolate the test area. A steel 3 centimeter diameter cylinder was bonded to the epoxy. A tensile force was increased on the steel cylinder until the test area was torn from the concrete. Normally, the epoxy would not tear loose but rather the concrete would break at a depth of 4 to 6 mm. The tensile force was measured to provide the strength of the concrete to which the epoxy is bound. In this way the bond strength of the epoxy after it had coated the concrete was determined. A minimum of three tear off tests was conducted on each slab. In addition to the tear off tests, other quality control measures were strictly enforced. No work other than sandblasting was permitted when temperatures were below 10° C or when free moisture was present in the air or on the pavement surface; no epoxy work was permitted when the relative humidity was 90 percent or greater; all joints had to be properly cleaned and sandblasted before the area could be epoxy coated; and a styrofoam backing material was installed in the joints before the actual coating took place.

The epoxy coating work was completed on time in September 1978. Because the epoxy overlay required no elevation or changes to existing drainage structures, the work could be conducted in phases where no more than 20 percent of the ramp was closed at any one time. This resulted in minimum disruption to MAC operations. Final costs for the project were $2,072,000 to coat 129,000 square meters for an average price of $16.06 per square meter ($13.45 per square yard). This is a 39 percent savings, or $1,291,000 over other alternatives. A five year warranty was obtained from the contractor.

HANK MARIEN *is a Research Engineer in the Directorate of Engineering and Services Laboratory, HQ Air Force Engineering and Services Center, Tyndall AFB, Florida. At the time this article was written, he was the HQ USAFE pavements engineer. He earned his bachelor's degree from Dickenson College and his master's degree in civil engineering from Purdue University.*

Recent detailed inspections of the area show no major deterioration. In a few places where joints were improperly prepared, minor cracking and spalling of the coating has occurred along about 800 linear meters. In the spring of 1979 the contractor made repairs to these areas. The coating has suffered abrasion where high speed rotary snow brooms are allowed to remain in contact with the surface for longer than one minute. Educating the sweeper drivers has largely eliminated this problem. Extensive snow removal operations using urea, isopropyl alcohol, high speed brooms and snow plows were conducted for 51 days in December, January and February during the winter of 1978-79. F-4 aircraft used the epoxy coated taxiway regularly and occasionally hold there while waiting for flight clearance. No snow removal, deicing or blast damage has been observed.

In summary, experience over three winters has shown that the epoxy coating has been effective when properly applied over sound concrete. The use of epoxy saved over $1.2 million dollars and greatly reduced the effort required for repair of the apron. Germany has adopted epoxy as a standard repair for eroded surfaces on its high speed highways and is in the process of coating its airfields during the 1980-81 construction season. Additional savings can perhaps be realized in the United States by prudent use of epoxy coatings.

E&S

Sand is broadcast over the surface of the epoxy coating to provide a non-skid surface.

Enterprising firemen at Griffiss AFB developed a unique baby sitters safety training program that has taught over 300 youngsters what to do when the unexpected occurs. It's another example of a successful approach to doing the job better. In addition, it has received national recognition as ...

An Award Winning Fire Prevention Program

Students of the Baby Sitters Fire Safety Program watch a demonstration on the use of extinguishers.

Students participate in a live fire demonstration and are trained to use a fire extinguisher.

by Mikel P. Buczkowski

An original fire prevention program, directed at the various responsibilities a baby sitter must assume and what actions to take if the unexpected should occur, has earned the Griffiss AFB Fire Department national recognition.

The Baby Sitters Fire Safety Training Program, developed in the spring of 1978, provides training for young people, ages 11 and over, on the full responsibilities of baby sitting. The program was judged outstanding in the Government and Military Division of the National Fire Protection Association's annual "Learn Not to Burn" competition in the third quarter of 1978. It was one of the 12 winning entries out of a total of 73 submitted in the contest.

With 785 family housing units on base and many personnel living just off base, firemen recognized the need to develop the program. With the assistance of the Base Youth Center, Child Care Center, Boy and Girl Scout Troops on base and Security Police, the program is offered quarterly to all interested youngsters. It consists of two, two-hour sessions held on consecutive Mondays. Visual aids and live demonstrations supplement the basic lectures which are presented by firemen, an emergency medical technician, base security police and Child Care Center personnel.

M.P. BUSZKOWSKI *is Chief of the Fire Prevention Section, 416 Civil Engineering Squadron, Griffiss AFB, New York. He has held this position for three years and has been associated with the Air Force for 21 years.*

Teenagers are alerted to the program by an extensive advertising program. Notices of the training are placed in the base **Griffiss Bulletin**

and in news articles in the base newspaper, **The Mohawk Flyer.** Also, posters and flyers are placed in the Base Exchange, the Commissary, and Youth Center.

Upon arrival at the first two-hour session, each student is given a package of material which contains pamphlets on baby sitting, home evacuation procedures and fire prevention techniques. The program begins with a lecture on home fire prevention, is followed by the movie "Learn Not to Burn," and a discussion on home evacuation procedures. This is followed by a talk on house security by a member of the Base Security Police, and the session is concluded with a demonstration on basic small child care, using a baby mannequin, by a representative from the base Child Care Center.

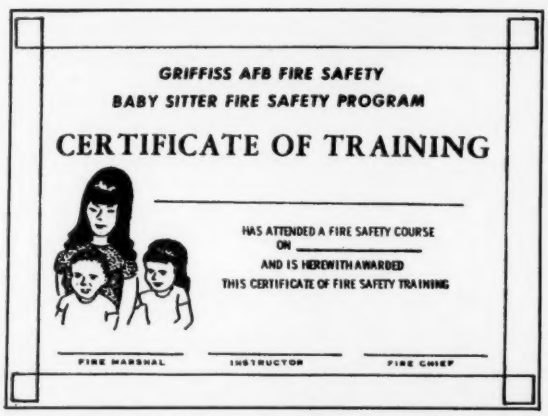
The second two-hour session begins with a review of the topics covered in the initial session. Next a training program is conducted on the many phases of emergency first aid, including cardio pulmonary resusitation techniques. This is followed by a live fire demonstration using a portable fire trailer. During this phase, students actually participate in "hands-on" training, extinguish both Class A and B fires, using the same type of extinguishers (2½ pound, A-B-C) that are mounted in every kitchen in every housing unit on base. The emphasis here is that the most important action to take is to have everyone evacuate the house and then to notify the fire department. A final question and answer session is conducted with active participation by the students.

Upon successful completion of the two training sessions, a graduation ceremony is held, and diplomas and wallet size certificates are awarded to the students by the instructors.

The response to the Griffiss Baby Sitters Fire Safety Training Program has been rewarding; eight classes (16 sessions) have been held to date. The program has trained over 306 youngsters and firemen believe the baby sitters will know what to do when and if that unexpected emergency may occur. E&S

GRIFFISS AFB
ROME, N.Y.
BABY SITTER COURSE
HIGHLY RECOMMENDED BY PARENTS
SPONSORED by THE BASE FIRE DEPT. at the YOUTH CENTER
BLDG. - 706
OCT. 16th & 23rd - 6:30 - 8:30 PM
OCT. 30th & NOV. 6th - 6:30 - 8:30 PM
* THIS COURSE OPEN TO ALL POTENTIAL BABY SITTERS (BOYS, GIRLS - AGE 11 OR OLDER AND ADULTS).
·TRAINING WILL INCLUDE: FIRE SAFETY, CHILD CARE, FIRST AID & SECURITY IN THE HOME.
SIGN UP NOW... by calling
FIRE DEPT - 4021/2658/2221 anytime
YOUTH CENTER - 330-4414 12:00-5:00

Posters and flyers are placed in such areas as the Base Exchange, Commissary and Youth Center, inviting youngsters to sign up for the program.



A wallet size certificate is presented to each student who completes the training program.

WORTH NOTING

Two Bases, Forester Win Environmental Awards

Environmental Quality Award
Vandenberg AFB
Gen Hill MG Coy LC Earl Kruger

Natural Resources Conservation
Shaw AFB
Gen Hill Col Paul Henkel

Natural Resources Conservation
Personal Award
Gen Hill John Haygood

Two Air Force installations and a natural resources planner were named recipients of the General Thomas D. White Environmental Awards for 1978. General James A. Hill, Vice Chief of Staff, made presentations to the winners in ceremonies at the Pentagon recently.

Vandenberg AFB, California, was selected as the winner of the Environmental Quality Award. It marked the second time in three years that the base has copped the award. The base's most significant accomplishment in 1978 was its outstanding planning and environmental analysis in connection with the space shuttle and MX programs.

Shaw AFB, South Carolina, was honored as the winner of the Natural Resources Conservation Award. A small installation, the base distinguished itself by developing virtually all facets of natural resources, ranging from reforestation to establishing a unique wildlife program for nonhunting recreation. It was also cited for its Youth Conservation Corps program.

John A. Haygood, a forester by profession and natural resources planner at Barksdale AFB, Louisiana, received the personal award for Natural Resources Conservation. He was recognized for his leadership in a wetland development and his extensive research in cooperation with local universities.

The General Thomas D. White awards were established in 1959 to recognize installations for outstanding efforts in fish and wildlife conservation and were broadened in 1971 to cover more general endeavors in environmental protection.

Linder Named Housing Management Officer of Year

Eleanor Linder, housing management officer at the Air Force Engineering and Services Center, Tyndall AFB, Florida, recently received the Professional Housing Management Association's plaque naming her Housing Management Officer of the Year. Brig Gen Clifton D. Wright, former AFESC commander, presented the award on behalf of the association. Mrs. Linder was selected from housing management personnel of all Federal agencies. Her selection was based on her contributions to housing management and on her character, job accomplishment and community involvement.

Eleanor Linder accepts plaque honoring her as the Housing Management Officer of the Year from Brig Gen Clifton D. Wright in recent award ceremonies at the AFESC.

Are the manhours spent training, the dollars spent equipping, and the overhead expense managing the Prime BEEF program worth it? Here's the response from ...

One Squadron that's Bullish on Readiness

by Lt Col Allen J. Sailer, PE, and Capt Kenneth C. Emerick

It's 0330 and too early for anything but sleep. Suddenly you are awakened by a phone call. Almost 28 hours later, you, your team and its mobility gear are airborne, with the Mid-East as the destination point. Later you are informed that hostilities are imminent and your team will be assisting in the set-up of a new base. Adrenalin starts to flow and mixed thoughts run through your mind; there is little sleep now.

When the aircraft reaches its destination and finally unloads, it is dark. After all your equipment has been off-loaded, your team commander is informed there are no facilities available to house or provide for your team and you will be required to start work within six hours. You are also informed, however, that another CF-2 team should be joining you soon and that a CF-1 team has arrived and has been working since arrival seven hours earlier. What you are given is a portion of land in a far corner of the base with limited security. You will be required to provide beddown for your team and the other CF-2 team within six hours.

How do you effectively prepare a team for such a deployment? These are the thoughts that run through

An advance fire team prepares for a Prime BEEF field training exercise.

Personnel go to work on a bomb damage repair exercise after a simulated aggressor attack.

A medical evacuation demonstration is given on proper loading procedures.

the minds of a Prime BEEF manager, NCOs and team chiefs. To start with, about four weeks of preparation and coordination along with plenty of public relations normally proceed an exercise such as the following:

1230, Wednesday, Mather AFB, California:
It was a clear and bright summer day. My view and enjoyment of it was abruptly interrupted by the ringing of the telephone. It was the Service Call Desk informing me my CF-2 Prime BEEF team was deploying for its first annual field training exercise. The call kicked-off two days of some of the most hectic training of my career.
1330: Sixty-eight of the 70 team members reported in. All 70 were present for duty at A+1 hour and 15 minutes.
1400: The first two squads were loaded on a bus to outprocess at CBPO. The bus returned and the second two squads were loaded. The first two squads returned and started inventorying mobility bags. The entire team out-processed in one hour and five minutes. The response was great from personnel, transportaiton and hospital people. Many new team members didn't have required shots. I made a note to review in-processing procedures for civil engineering personnel.
1500: An inventory was conducted on mobility bags. Helmets, belts, ammo pouches, canteens and first aid kits were issued. Equipment boxes were inventoried. Boxes, rations, supplies and mobility bags were loaded on two 40-ft flat beds.
1745: Troops were briefed on what's in store for the next two days along with some philosophy on Prime BEEF. They were released with instructions to form at 0600 the next day, with all required personal gear, ready to deploy.
0600, Thursday: All four squads were formed and the open ranks inspection came off surprisingly smooth. A personal gear inspection followed.
0700: New M-16s were broken out; control numbers were stenciled on the stocks and they were issued along with blank ammo and clips. By now, I could detect a bit more spring in the steps of the troops.
0815: A convoy was formed (two jeeps, three deuce-and-a-halfs, two flat beds and a fire truck).
0900: The Security Police escort arrived and we moved out. Suddenly, the radio crackeled to life: the lead jeep reported a roadblock. The convoy halted while the fire team in the jeep proceeded to remove it. All squads took defensive positions, during which an agressor machine gun hit our left flank. Fire team tactics went quite well considering we only had a slide briefing for training. Our troops took out the aggressors in short order.
1015: The convoy arrived at the camp site. The lead squad swept the site for booby traps and found none. The site developers laid out the campsite while tent boxes were unloaded and tents unpacked.
1115: Lunch break!
1200: All 4 squads broke off for more fire team tactics.
1330: Tents and camp facilities were set up. The area was mapped and the perimeter defense line was established and booby traps set.

1630: Dinner was followed by first aid training and a briefing on medivac procedures, compliments of the Army National Guard.

1900: Agressors attacked the camp. All squads took up defensive positions. A bomb took out a group and the command tent was soon littered with wounded. A call went out for a medivac and three litter cases were airlifted out. Action continued furiously.

2130: A gas attack occurred. The aggressor team penetrated our defense and the team chief was taken out of the action.

2400: Action terminated. Weapons were secured. An inspection of squad tents revealed a lot of tired troops.

0500, Friday: Wake up and a breakfast meeting with squad leaders took place to discuss plans for the day.

0600 to 1200: Camp was broken, all bags and equipment were inventoried, weapons cleaned, the camp area policed and all personnel deployed back to the main base. Equipment was stored. Troops were briefed on a Bomb Damage Repair exercise to start Monday morning, and they were released for the weekend.

0600, the following Monday through 1400 the next Saturday: After a weekend break, we jumped into the bomb damage repair phase of our exercise with renewed vigor. It consisted of removing utilities, wood siding and some dry rotted structural members from a WW II vintage warehouse, replacing them with new structural sections and vinyl coated steel siding, and reinstalling utilities. The net result was an essentially new 9,600 square foot building at a material cost of less than $12,000.

So ended one of the most rewarding experiences of my military career. It was most satisfying to watch a group of multi-skilled individuals, unaccustomed to continuous close association, mold into a cohesive, motivated and proud unit. To get to this point, however, took a lot of behind-the-scenes coordination and management effort on the part of our Prime BEEF office (now Logistics and Readiness). The progress from zero organization a year ago to where we are todav can be attributed to the zeal and dedication of the people in this office. Not having the benefit of "the book," they charted their own course and got under way. Residual equipment from the old C team plus about $80,000 of new equipment bought with left over civilian pay money, brings both CF-2 teams and the CF-1 team to a 50 percent equipage level. Add to this a hectic scheduling and recording problem for the various training requirements of over 200 military on ten teams, and the magnitude of the Prime BEEF management effort becomes more apparent. From observing our exercises this past year, they promise even bigger and better things next year.

Are all the man-hours spent training, the dollars spent equipping, and the overhead spent managing Prime BEEF worth it? You bet! In today's fast changing world and limited resources, mobility is the only smart and cost effective option open to the Air Force. Getting ready has been a lot of work but not without its rewards. A lot remains to be done but we're confident that when needed, the 323rd Civil Engineers will be ready because we are "Bullish on Readiness." E&S

Convoy comes to a halt as the squadron takes up defensive positions during an attack.

COLONEL SAILER *is Commander, 323 Civil Engineering Squadron, 323 Air Base Group, Mather AFB, California. He holds a bachelor's degree in mechanical engineering from North Dakota State University and a master's degree in industrial engineering from the University of Pittsburgh. He is a registered Professional Engineer in Ohio.*

CAPTAIN EMERICK *is a Logistics and Readiness Officer for the 323 Civil Engineering Squadron, 323 Air Base Group, Mather AFB, California. He earned his bachelor's degree in civil engineering from St. Martin's College and his master's degree in systems management from the University of Southern California.*

Officer Volunteers Sought for Construction Program

An Israeli Air Force Regional Civil Engineer (AFRCE) was established at Tel Aviv in August 1979 to accomplish air field construction in support of the recent peace accords. Civil engineering officers in the grades of Captain, Major and Lieutenant Colonel desiring to volunteer for assignment to the AFRCE should submit an Air Force Form 90 to their local CBPO with an information copy to AFMPC/MPCROS5D, Randolph AFB, Texas 78232.

Officers selected will serve a 12 month remote tour and report during August/September 1980. Questions may be directed to PALACE Blueprint at AUTOVON 487-3451.

To combat the high cost of heating water in family housing units on Hickam AFB, engineers there turned to a heat pump water heater. It's paying off in that customers are getting hotter water quicker while using 58 percent less energy. It's also an example of doing more for less while continuing to provide service to customers.

Hot Water at Less than Half the Cost

by Capt John L Heiser, EIT

More electricity is expended to heat water in military family housing units than any other single requirement except air conditioning. At Hickam AFB Hawaii, because of the mild climate and prevailing trade winds, not to mention a successful energy conservation program, even air conditioning takes a back seat to the high cost of heating water. To combat the high cost of heating water, engineers looked for an alternative to the conventional resistance type heater. Specifically, they searched for a relatively low cost, low maintenance system that would provide at least the same service, if not better service, to customers. (The low cost parameter eliminated solar systems from the beginning.) Engineers believe they have found the answer to low cost hot water through the use of a heat pump water heater (HPWH).

The HPWH operates on the heat pump principle, i.e., a compressor operating in a non-reversing refrigeration circuit extracting heat from the air and expelling it through the condensor to the water. The particular model installed in a test home on Hickam AFB operates on this principle and can be connected to existing water heater storage tanks.

The heat pump is packaged in an 18 by 10½ inch by 26 inch high enclosure, containing a one horsepower compressor air-to-refrigerant evaporator coil, air fan, water circulating pump, refrigerant-to-water condenser coil, capillary tube, and controls. Air is forced over the evaporator coil by the fan, while water is circulating from the bottom of the existing hot water storage tank through the condenser coil, and returned to the top of the tank by the circulating pump at a miminum temperature of 115°F. When the inlet water temperature is between 40°F and 105°F, the HPWH outlet water will be 115°F. For inlet water above 105°F, the HPWH outlet water will be 10°F to 16° above the inlet water temperature.

Heat pump water heater.

For example, the cold water temperature at Hickam AFB is about 77°F. This inlet water would be heated to 115°F on the first pass through the HPWH. When the inlet water temperature is 115°F, then the HPWH outlet water temperature would be between 125°F and 131°F. The HPWH is controlled by a thermostat (24 volt circuit supplied as an integral part of the unit). When the water in the bottom of the tank drops to below 120°F, the thermostat turns the HPWH on and when the bottom of the tank reaches 130 to 135°F, it turns the unit off. This produces an average tank temperature of about 140°F at cut-off. If a completely cold water tank situation is encountered, the HPWH will immediately start putting 115°F water in the top of the tank ready for use. This produces quicker "recovery" of hot water for use than a top resistance heating element which must heat the entire top quarter of the tank to 115°F before any 115°F water is available. Therefore, we are providing hot water quicker to the test home customer through the HPWH.

Although the preceding is theory and explains what the HPWH is supposed to do, here are some hard facts of what the HPWH has accomplished since it was installed on base on 28 June 1979. The HPWH was installed in a metered home and historical data (monthly electrical consumption) are available. During July, August and September, the average electrical consumption in the test home was reduced 27 percent. This reduction equates to over $27.00 a month in savings based on the current elec-

trical rates paid by Hickam AFB. Known future rate hikes will of course improve the dollar savings. Based on the current dollar savings, the HPWH will have paid for itself in 2.1 years. Based on the amount of water heated by the HPWH (we have a water and watthour meter connected to the HPWH) and the number of kilowatt hours (KWH) used to heat this water from 77°F, we have calculated than an average of .056 KWH was used by the HPWH to raise the temperature of one gallon of water from 77°F to 132°F.

A conventional resistance type water heater would require .134 KWH to produce the same rise in water temperature for one gallon of water. A comparison shows the HPWH requires 58.2 percent less electricity to cause the same change in temperature per gallon of water. If, for comparative purposes, resistance heating of water is defined as the base and given a coefficient of performance (COP) of one, this means for one input unit of electricity, one output unit of heat is produced. The field test of the HPWH has demonstrated a COP of over 2.3 which means more than two units of heat are produced for each unit of electricity used.

CAPTAIN HEISER *is Chief of Readiness and Logistics, 15 Civil Engineering Squadron, Hickam AFB, Hawaii. He earned his bachelor's degree in industrial engineering from the University of Missouri and his master's degree in operations management from the University of Arkansas. He is an Engineer-in-Training in Missouri.*

In summary, we at Hickam AFB have in no way sacrificed customer service and satisfaction by installing the HPWH. The resistance elements in the existing conventional water heater are intact and fully operational. Should the test HPWH fail, the customer simply turns on the 220 volt circuit breaker for the conventional water heater and a backup hot water system is readily available. We have provided the customer with hotter water quicker while using over 58 percent less electrical energy. In addition, we have provided our customer with some "free" air conditioning because a side benefit of the particular model HPWH we installed is that it is equivalent to a ¾ ton air conditioner operating approximately six hours per day.

Through innovative thinking and sincere concern for our critical energy situation, we at Hickam AFB are truly doing more with less and pleasing our customers as well.

Park Named in Memory of Airman

A Civil Engineering airman who was killed in an accident during construction of a picnic area at Kadena AB, Okinawa last year, was honored by having the area dedicated to his memory.

Sr. Amn Mark S. Rodrigues, a heavy equipment operator with the 18th Civil Engineering Squadron, was killed in the accident with a back hoe during the self-help project during off-duty hours. After a decision was made to dedicate the park to his memory, other volunteers continued work on the project until its completion.

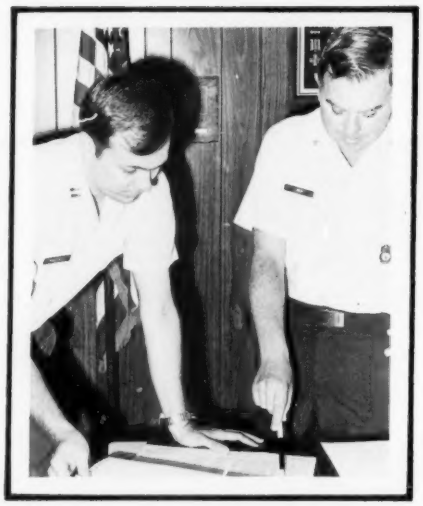
Five members of the airman's family were on hand for the park's dedication on 1 September 1979. During the ceremonies, the Kadena AB base commander made a posthumous presentation of the Air Force Commendation Medal to Rodrigues. Also, a sister of the airman unveiled a memorial monument which reads: "Mark S. Rodrigues Memorial Picnic Area. In memory of Amn Mark S. Rodrigues who while unselfishly giving of his personal time and effort to further the completion of this picnic area, lost his life. Mark's concern for the needs of his fellow man gained him everlasting respect. With this in mind, this facility, named in honor of this fine young man, is provided for the enjoyment of those that follow."

At informal meetings, the Deputy for Resources and the Chief of Resources and Requirements review the DPL. At these meetings, the Deputy's entire program is discussed, new priorities assigned and unneeded work cancelled.

After working for two months without the Work Request Review Panel, it was apparent that some type of dialogue was needed between the customers and the Base Civil Engineer to identify true priority work. At Moody AFB, the solution was ...

"BLIS"

for the customer



Weekly reviews of the DPL by the Base Civil Engineer and the Chief of Resources and Requirements keep the Base Civil Engineer appraised of each Deputy's program.

The Customer Service Unit uses the DPL to answer inquiries made by customers.

Editor's Note: The Wing at Moody AFB, Georgia, is organized under the Tri-Deputy System. The three deputies are Deputy Commander for Maintenance, Deputy Commander for Operations, and Deputy Commander for Resources. The BLIS retrievals in the article are used by these Deputies and the Hospital Commander. For purposes of this article, the Hospital Commander is referred to as a Deputy.

by Capt Calder D. Kohlhaas, Jr, EIT

The recent reorganization of base level civil engineering allowed for the elimination of the Work Request Review Panel (WRRP). When this panel was discontinued, the work requests were acted on more quickly, and delays due to the laborious approval/disapproval process declined. After working for two months without the WRRP, it became apparent that some type of dialogue was needed between the customers and the civil engineer to identify true priority work. At Moody AFB, Georgia, the solution was found in a Base Level Inquiry System (BLIS) of the Work Order Master (WCM) File. We called the product the Deputy Commander Priority List (DPL).

The DPL was developed through trial and error until a workable format was achieved. The product now consists of three separate BLIS retrievals using the unique field to identify each work request/order by Deputy Commander and their assigned priority. The three BLIS retrievals are

- **Work Requests/Orders to be Planned.** These include all work requests in "D" status and all work orders which have been approved and are waiting planning.
- **Work Orders Waiting Materials.** These involve all work orders with an estimated cost, but lacking a material complete date.
- **Work Orders to be Scheduled.** These are all work orders with a material complete date.

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These three products, when combined, make up the DPL and provide each commander with his total work order/request picture, and civil engineering management with an excellent tool. The DPL is produced bi-monthly in six copies with one copy provided to each commander. The remaining copies are used by the Base Civil Engineer (BCE), Environmental Planning Section, Chief of Resources and Requirements, In-Service Work Plan Programmer and Customer Service.

The most important copy is the one provided to each commander. With this product and an appointed contact within each deputate, the dialogue which was lost when the WRRP was discontinued is regained with significant improvements. After one month of using the DPL, the deputies began to intensively manage their civil engineering program. The dialogue between the Chief of Resources and Requirements and the contact within each deputate resulted in cancellation, reduction in scope and realistic prioritization of the work requests/orders in their program. The contact points are second in command in each deputate; hence, decision making is at the level needed to insure successful monitoring and prioritization of each program. In addition, these same individuals attend the weekly BCE Update Briefing, further developing their understanding of our system and the inherent constraints. BCE management uses the DPL in several different areas. The BCE uses it on a daily basis during conversations with the command element. The Environmental Planning Section uses it to develop programs and track service contract work and the Customer Service Unit uses it to answer inquiries from base customers. But, the primary user is the Chief of Resources and Requirements.

With DPL in hand, the Chief of Resources and Requirements makes bi-monthly visits to each deputy, providing the new DPL and discussing each deputy's program. It is at this time that priorities may be changed and individual work orders cancelled or changed. These bi-monthly visits have also contributed immensely to establishing a solid IWP by providing the IWP Programmer with an up-to-date listing of all work with realistic priorities assigned.

The IWP Programmer is the final key to making the DPL work. To initially succeed, the program must have high level support. To achieve lasting success, the BCE, through the IWP Programmer, must insure that the priorities assigned by the deputies are used in developing the program with sufficient visibility and explanation to the customer to maintain system credibility.

The DPL works at Moody AFB and is under consideration by Headquarters Tactical Air Command for commandwide implementation. This is not to say it is the only way to fill the gap between the customer and the civil engineering organization, but it is a management technique which improves customer relations, customer support, and customer opinion of the civil engineering organization. E&S

Sidewalk Fire Chief or Professional Fire Marshal

Fire fighting deals with emergencies. During emergencies, even the smallest error can be magnified into possible serious consequences. The bottom line is you must know what you are doing or you don't belong at a fire scene.

by CMSGT James R. Legg

Imagine yourself as the new Base Civil Engineer (BCE) at anywhere Air Force Base, now or at some time in the future. Further, imagine that as the BCE you hear the fire department radio interrupting your train of

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thought with 10-10-10. We have an inflight emergency: a C-141 aircraft with 25 people on board and the two starboard engines on fire. The aircraft will be landing on 32 left in approximately five minutes with 50,000 pounds of fuel.

You know you must respond to the emergency as the base fire marshal but you just haven't had the time to get to the fire station since you reported on base. If you only had the time to prepare yourself you wouldn't have been in this predicament. You are not sure when to do something and when to stand back and get out of the Fire Chief's way. At the worst, a decision you make could cause the loss of life or valuable property due to diverting the Chief's attention at a critical minute. You think to yourself "If the fire chief can bail me out of this one, I will make sure that I become something more than a Sidewalk Fire Chief at the next crash/fire scene."

The fire business is unique in that respect. Fire fighting deals with emergencies. During emergencies even the smallest errors can be magnified into possible serious consequences. The bottom line is: **You must know what you are doing or you don't belong at a fire scene.** The moral of this story is: Get involved and learn enough about fire protection to know when, where, how much and what help the chief may need at a fire/crash emergency.

We were recently assigned as the Base Fire Marshal and Base Fire Chief at an overseas Air Force installation and, through the efforts of knowledgeable and understanding Wing and Base Commanders, command and control at fire and crash scenes was always professionally handled. We were able to do this because we followed some simple guidance which we felt was invaluable to us in preparing for the tasks involved in assisting the fire chief in his important job. The guidelines were:

- **Discourage untrained people from getting involved in fire emergencies.** Although the intentions may be good, the results in some cases have been devastating. In this respect, you should develop a base/wing regulation that will limit access at the scene of a fire emergency to essential people only.
- **Make it a point to learn all that you can about the activities of the fire department.** First, know the mission of your fire protection organization; second, get involved with problems in all areas of fire protection; they don't just go away; third, know the capabilities of your key fire protection supervisors. (If you don't, it's difficult to back them when problems arise.); and finally, attend locally scheduled exercises on a frequent basis to evaluate crew proficiency.
- **Learn your base's facility fire weaknesses and then support the correction of fire hazards and deficiencies that could cause the loss of life and/or valuable property.** Ensure that (1) installed fire suppression/detection systems are available where required (this will include establishing procedures that will provide optimum system reliability); (2) sound fire prevention procedures are established and practiced in each activity or facility under your jurisdiction (this will include developing written procedures outlining what to do in case of fire); (3) effective fire prevention awareness and technical training programs are in effect at your installation (this can only be evidenced by supervisors knowing what their people need to know and questioning them to see if they know it).

We certainly haven't covered all of the duties and responsibilities you will encounter in fire protection/prevention. To do this would require volumes of books and many hours of study. The key to a successful fire organization is keeping commanders at all levels involved with and informed of the fire hazards that exist; your capabilities; and your programs. We are convinced that if you take the time to get involved, you will not be counted among the "sidewalk fire chiefs" who run the risk of tragedy through ignorance. E&S

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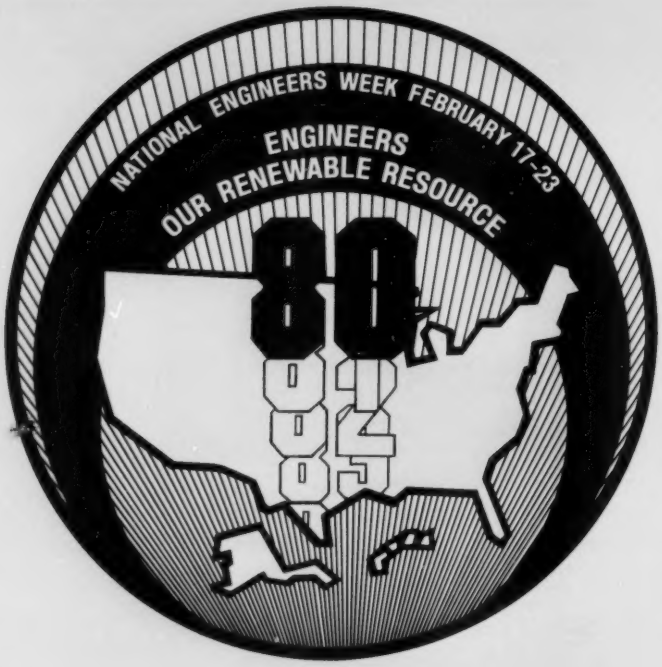

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